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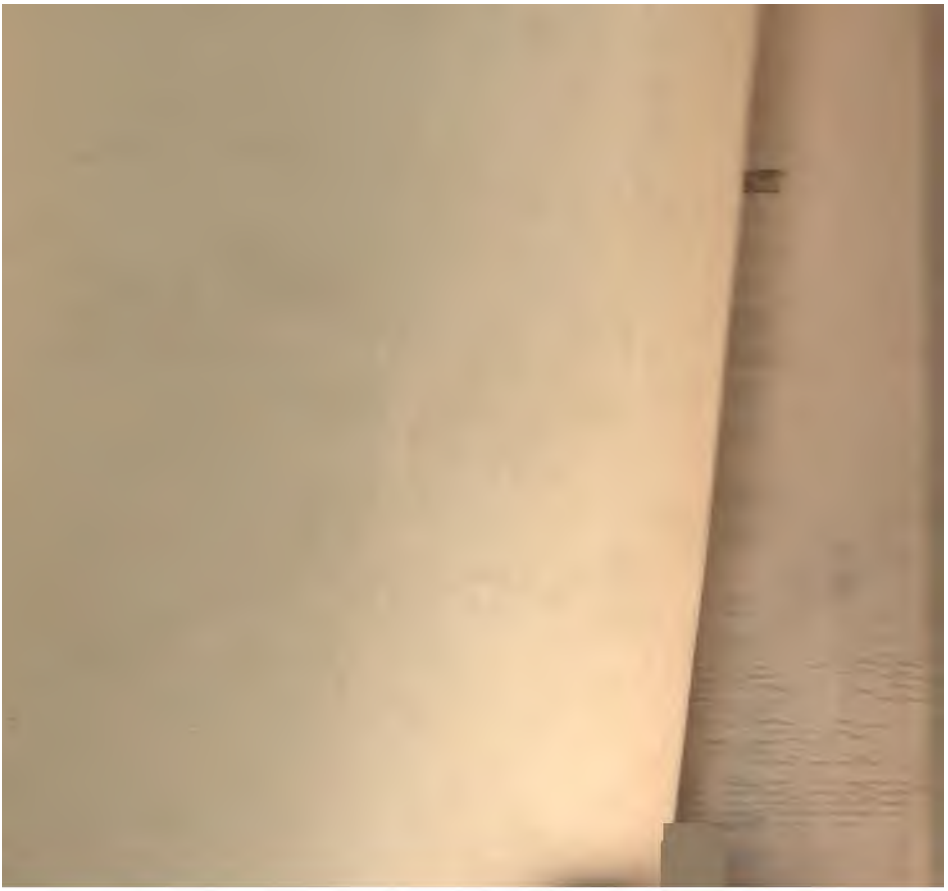


Mines

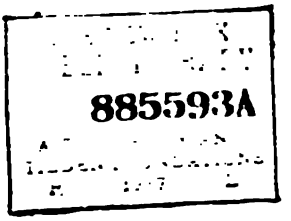
THE COPPER HANDBOOK

MANUAL OF THE COPPER INDUSTRY OF THE WORLD

1909

VOL. IX

COMPILED AND PUBLISHED BY
HORACE J. STEVENS
HOUGHTON, MICH., U. S. A.
1909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Following the text of the book is an advertising section, carrying the announcements and cards of manufacturers, dealers in mining supplies, copper producers, engineers, metallurgists, chemists, trade journals, etc.

PREFACE.

This edition of the Copper Handbook, the ninth annual volume, is given to the public with a lively sense of its shortcomings, as compared with most of the preceding issues. To be sure, it is much larger and more comprehensive than any of the previous numbers, but a very large portion is a reprint from the issue of the year preceding. The new matter in the book is comprised in the two final chapters, giving an additional list of mines, with descriptions, and the usual statistical chapter, fully revised.

In explanation of the deficiencies of the present volume, it is necessary to state that an average of fourteen months has been required for the revision and issue of each annual number, and this has thrown the date of issue so far behind that this volume, dated 1909, will appear in March, 1910. The present book, the ninth in the series, is, like all preceding issues, the work of a single man, the author having had no assistance, except of a purely clerical nature, in the preparation of the work. The plan of writing followed is one that is very laborious for the author, but renders the work much better adapted to the needs of its readers. The plan of writing the book that has been followed from the first edition calls for the examination of a vast amount of material, from a great variety of sources, and the extraction therefrom of matter for the book in the form of notes. For the present volume upwards of one hundred thousand notes were dictated or written. These notes when written are placed in a certain set order, under various sub-captions, and the new descriptions written or dictated from the information contained in these notes, combined with available matter from the preceding edition, together with data contained in the direct reports of the properties furnished for this work, where such are on file.

It is obvious that the work of preparing an annual revision of the book along the lines that have been followed in the past is beyond the scope of one man's powers, and for future editions it will be necessary that the labor be divided, to which end capable assistance will be secured. It is hoped that what the Copper Handbook may lose in the unity that results from the work of a single author may be more than made up by the greater regularity of date of future issues, and the full and complete annual revision that should be given such a work.

To the end that nobody may have a just cause of grievance against the book or its author, a circular letter will be mailed to every old subscriber to the work, before the date of issue, giving full notice of the deficiencies of the present volume, and all others ordering the work will be given the right to return it within a week, should it prove unsatisfactory.

The book is printed, this year as last, on special thin paper made for this publication, this being necessary in order to keep the work in single volume under the weight limit of two kilograms prescribed by the International Postal Union.

In the nine years of its life, the Copper Handbook has grown from a modest volume of 328 pages, in its first issue, to the present size of 1,630 pages, and the pages, as now set, contain 34.8 per cent more matter than was the case with volumes one to seven, inclusive, rendering the present issue equivalent, in matter, to 2,200 pages of the earlier editions. The first volume contained descriptions of 256 properties, while the present issue lists and describes no less than 7,551 mines and mining companies. So far as known, this is the largest number of titles ever given in any work of reference devoted to any branch of mining, or to mining as a whole.

The author wishes to return his sincere thanks to the mining companies and mining engineers who have shown their friendship for the book by furnishing returns, data, information and corrections. Without their assistance the book would be but a mere shadow of what it now is.

As in preceding editions, the author wishes expressly to disclaim all pertensions to infallibility, and to request criticisms, corrections and suggestions from any and all honest sources. Criticism and corrections will be welcomed, for it has been by such assistance that many past errors have been set right, and many pitfalls avoided. In this connection the author wishes to especially request investors in copper shares to bear in mind that the Copper Handbook is not infallible, and that errors will creep in, while later developments may change, most radically, the position or value of any given mining stock. While the matter in this work has been prepared in good faith, and with great care, there are several hundred thousand statements of fact contained within the covers of the book, and even were the proportion of accuracy to run as high as 99 per cent., which scarcely would be possible, the work would contain several thousand errors. All investors and all intending investors should use reasonable care and discretion in buying or selling mining shares.

To the subscribers of the Copper Handook, to whose loyal support the success of the enterprise is due, and who have given this work the largest circulation of any mining annual printed in any language, the thanks of the author are returned most cordially.

HORACE J. STEVENS.

HOUGHTON, MICHIGAN, U. S. A., Dec. 30, 1909.

THE COPPER HANDBOOK

CHAPTER I.

THE HISTORY OF COPPER.

The mists of antiquity shroud the discovery of copper, but the metal and its alloy, bronze, were known at a period so remote as to antedate the beginnings of history. Possibly gold, which occurs native, was discovered before copper, but the uses of gold in prehistoric times seem to have been purely ornamental, while those of copper, and its alloy, bronze, were utilitarian as well as ornamental, from their discovery.

The Neolithic, or polished stone age, was succeeded by the age of bronze, but the process of substituting weapons and implements of bronze for those of polished stone was not instantaneous, and doubtless was spread over hundreds of years, as polished stone and bronze instruments, obviously of about the same age, have been found in juxtaposition, at many points, and it should be borne in mind that while the comparatively-civilized peoples of Asia Minor and the Nile valley were far advanced in the bronze age, the Greeks doubtless were in the Neolithic period, while the barbarians to the north had not advanced beyond the Paleolithic age. Similarly, the natives of the two Americas were in the bronze and stone ages, when discovered by Columbus, in the Fifteenth Century, at a period when the civilized peoples of Europe had left the bronze age two thousand years behind.

Copper is one of the six metals mentioned in the Old Testament, and the bible names Tubal Cain as a cunning artificer in brass and iron. A legendary account of the discovery of iron on Mount Ida has been handed down, but it is certain that copper was known to the ancients for a long time, probably some thousands of years, before the discovery and utilization of iron, and it is known that copper mines were worked on Mount Ida, in Asia Minor, centuries before the alleged discovery of iron.

According to the latest historical investigations, copper was known long before the time of Menes, the founder of the First Dynasty, who was the first king of Upper and Lower Egypt, and who reigned at a period possibly as early as 5500 B. C. Copper was known, at least as a rarity, by one of the aboriginal races of Egypt, probably as early as 7000 B. C. and possibly at a date considerably more remote. At a much later period, yet antecedent to the First Dynasty, the use of copper became more

widely disseminated, and the metal was in quite general use in Egypt before the time of Menes. It is believed that the Egyptians used unalloyed copper for centuries before discovering the use of tin, the alloy of copper and tin producing bronze that is much harder than pure copper, consequently much better suited for weapons and implements of all sorts. The ancient Egyptians are believed to have used arsenic for hardening the copper when used alone.

Bronze was in very early use in Egypt, for the making of weapons and tools, and the use of bronze is mentioned in inscriptions antedating the great pyramids. Rawlinson says "A metallurgy of no small merit must have formed and originated the implements whereby materials, such as those used by the Egyptian sculptors, were worked with ease and freedom." Some of the blue and green pigments used by the earliest Egyptian painters contained copper.

King Sneferu, the first Pharaoh of the Fourth Dynasty, ascended the Egyptian throne at a date variously estimated from 2000 B. C. to 5000 B. C., succeeding the king who carved the great sphinx, and being in turn the immediate predecessor of Cheops, builder of the great pyramid at Gizeh. King Sneferu, according to the inscriptions of his reign, conquered the Sinaï Peninsula for its stores of mineral, hence the inference that its copper mines must have been opened at an even earlier date. The copper mines of Mount Sinaï, which are the oldest now known to man, are said to have been worked as recently as 1300 B. C. Ancient workings are still visible, with slags from the furnaces and occasional remains of tools. The oldest piece of bronze, of anything like an established date, is a knob from the scepter of Pepi I, a Pharaoh of the Sixth Dynasty, who flourished circa 3000 B. C. This remnant of the regal might of an early day now reposes in the British museum. The Posno collection, in the Louvre, at Paris, shows two small statues, believed by Perrot to date from the close of the Old Empire, or the beginning of the Middle Empire, circa 2300 B. C. These are light, hollow and cast in single pieces, showing workmanship of a high order. A hollow cast statue of Rameses II, of excellent workmanship, dates from 1300 B. C. As early as the New Empire, more than 2000 B. C., copper seems to have been the monetary basis of Egypt, as accounts were recorded in uten of copper, the uten being a spiral of metal, of about 91 grams weight. In the time of the New Empire, bronze was in use for armor and weapons, artisans' tools, occasional farm implements, household utensils, nails, locks, butts, hardware for chariots and boats, and for jewelry and general decorative purposes. In the old hieroglyphs, several varieties of bronze are referred to, according to their composition. The most common variety of bronze in use in ancient Egypt, as determined by modern assays, contained, respectively, 85 per cent copper and 15 per cent tin, and 88 per cent copper and 12 per cent tin, while bronze used for weapons and cutting tools contained 94 per cent copper, 5.9 per cent tin and 0.1 per cent iron, the iron probably having been included as an impurity, and not through design.

M. de Sarazé judges that copper was produced in Babylonia about 4000 B. C. Gudea, patesi or high priest of Lagash, who became a dependent king under Dungi II of Babylon, who reigned approximately 2000 B. C., at Ur—"Ur of the Chaldees"—collected, as material for temples and statues,

copper from northern Arabia, and the metal and its alloy, bronze, were in quite general use throughout Babylonia at least as early as 2000 B. C.

Apparently copper was known to the Greeks from the earliest historical times. The ancient Greek historians credited the discovery of copper to Cadmus, who also is said to have invented the alphabet, both of which credits are open to serious doubt, as Cadmus really adapted the Phœnician alphabet to Greek use and doubtless brought the first knowledge of copper smelting to the Greeks from the same source. Apparently copper was first found by the Greeks near Chalkos, on the Island of Eubœa, hence took the name of chalcos, and was so termed by Homer, Hesiod and other early Greek authors. Pliny states that the method of reducing copper from its ores was discovered on the Island of Cyprus, whence the metal was termed by the Romans, first aes cyprium, and later, cuprum. This discovery unquestionably was merely an adaptation of the methods known to the Egyptians several thousand years earlier. The name of the metal in most of the modern European languages, as the English copper, Swedish koppar, Norwegian kobber, German kupfer, Spanish and Portuguese cobre, and French cuivre, are corruptions of the Latin cuprum. In the ancient mythologies, copper was consecrated to Hathor by the Egyptians, to Aphrodite by the Greeks and to her counterpart, Venus, by the Romans.

It is probable that the first copper mines of Cyprus were opened by the Phœnicians and that knowledge of the metallurgy of the metal was derived from them by the Greeks. The Phœnicians also brought copper from Asia Minor, and later from Iberia, beyond the Pillars of Hercules, and some of the ancient Carthaginian mines, in the Provinces of Huelva in Spain, and Alemtejo in Portugal, were reopened during the latter half of the Nineteenth Century, and remain large producers. It is certain that the Phœnicians brought tin, and possibly copper also, from Cornwall, at a period as remote, in all likelihood, as 500 to 700 B. C., which would indicate that the native Britons were possessed of a rudimentary metallurgy of considerable importance, at a period long antecedent to the conquest of Cæsar. The hegemony of the ancient Phœnician world was wrested from the cities of Tyre and Sidon by Carthage, an early Phœnician colony which became far greater than its parent, and Carthage, in turn, lost the supremacy of the Mediterranean to the Romans.

The knowledge of copper possessed by the Romans doubtless was inherited from the Greeks, all of the historical evidences pointing to this conclusion, but it is certain that copper mines in Tuscany were worked by the Etruscans previous to the foundation of Rome. The copper mines of Piedmont, Liguria and Tuscany were worked extensively in Roman times, but the Iberian mines, wrested from the Carthaginians, formed the chief source of the copper supply of the Roman Empire. Spain has been furnishing copper to the world for nearly or quite three thousand years, and remains one of the principal sources of the world's supply. The Rio Tinto mine has been worked, off and on, for about three milleniums, yet remains one of the greatest copper producers of the globe. Prof. Vogt estimates that not less than twenty to thirty millions of metric tons of ore were mined during the eras of Phœnician, Carthaginian and Roman domination, from this mine alone.

During the dark period of the middle ages, mining, while not a lost

art, certainly was not followed as systematically and successfully as during the more prosperous and enlightened era of the Roman Empire. The world's supply of gold and silver decreased from century to century, owing to the losses from attrition and misplacement not being made good by new production. Iron, being subject to rust, was mined and smelted as required, though the production was surprisingly small, and it is probable that the United States Steel Corporation now turns out, in every working day, more iron than was produced in all Europe in a full year, during the period of greatest darkness of the mediæval era. The supply of copper during the middle ages must have been very small, but statistics are so fragmentary that they scarce afford basis for estimates.

The production of copper from Iberian mines was spasmodic, but more or less of the metal was produced in every century, though the industry suffered a severe check when Spain was lost by the Western Roman Empire to the Visigoths, who, in turn, were succeeded by the Moors, that warlike race that held possession of southern Spain and Portugal, until driven out, late in the Fifteenth Century, by Ferdinand and Isabella. The San Domingos mines of Portugal, which were opened, certainly as early as Roman times, and, in all likelihood, by the Carthaginians, or their predecessors, the Phœnicians, were worked spasmodically during the middle ages, and were reopened in 1859, under modern methods.

The mines of Italy and Austria were small producers of copper in mediæval times, the most important Austrian mine being the Gratslitz, in Bohemia, which probably was the largest European producer about the Fourteenth or Fifteenth Century, but which was abandoned in the Eighteenth Century, though reopened, on a small scale, late in the Nineteenth. There are evidences that copper mines were worked in Bulgaria, and probably in Servia also, during the Roman era, and the Servian mines were small producers during the middle ages. There also was a little copper mining in Hungary during mediæval times, and possibly in Roumania also. Copper has been mined and smelted on a small scale in both European and Asiatic Turkey for some centuries.

In Germany, the Rammelsberg mines, in the Ober Harz, were opened circa A. D. 933, and have been producers for nearly a thousand years. The Mansfeld mines of the Ober Harz, opened A. D. 1199, have been fairly steady producers for 700 years, though with occasional hiatuses in output, due mainly to some of the numerous wars that were at once the business and the recreation of the middle ages. These mines made about 1500 long tons of fine copper in the days of Martin Luther, and were producers to about the same extent in 1860, but since have been developed into very large and successful mines, by the use of modern methods and equipment.

Stora Kopparberg, at Falun, Sweden, was opened A. D. 1228, and is claimed to have given to the world, to the end of the Nineteenth Century, not less than 1,200,000 tons of fine copper, remaining a small producer.

One of the earliest English mines was at Newlands, near Keswick, in Cumberland. This property was worked as early as A. D. 1250, and was working as late as A. D. 1470. The Ecton Hill mines, in Staffordshire, were among the earliest English copper mines after Newlands, and the tin mines of Cornwall were small producers of copper also, at least as early as the time of Queen Elizabeth, and probably for a century or

two earlier, though copper production on a large scale began with the Eighteenth Century. The copper mines of Anglesea, in Wales, were producers in Roman times, and were reopened in the Eighteenth Century, but have been idle since about the middle of the Nineteenth Century. In Ireland, mines worked during the Eighteenth Century and up to their closing in 1880, have been reopened, in an exploratory way, during the early years of the Twentieth Century. As early as A. D. 1586, copper ore was shipped to Anglesea for reduction, and in A. D. 1765 there were several smelters treating copper ore near Bristol. The Welsh smelting industry at Swansea seems to date from the Sixteenth Century. The first copper pennies of England were coined A. D. 1717.

At the beginning of the Eighteenth Century Great Britain was making at least three-quarters of the world's copper. The Cornish mines produced 4,923 tons of refined copper in 1799, and the Welsh mines of Anglesea made nearly 2,000 tons in the same year. The great Mansfeld mine, in Germany, made only 372 tons in that year, and only estimates are obtainable for the products of other countries. Spain's output was insignificant, and the United States made but a few tons. Russia and Japan probably ranked next in importance after England as producers, and Austria, Norway, Sweden, Italy and several other nations made small contributions to the world's copper stock. Australia, South Africa and Canada were then unknown as sources of supply. It is a notable fact that one hundred years ago, the mines of the United States, Spain, Chile, Mexico, Canada, South Africa, Australia and Tasmania, which now make about 90 per cent. of the world's copper, were either totally undeveloped, or else producers of but a few tons each, while Great Britain, which made almost 7,000 tons of copper in 1799, produced but 550 tons in 1899.

At the beginning of the Eighteenth Century the English mines, in Cornwall, were making much the largest part of the world's copper output, and even at that date were of such considerable depth, and with such extensive underground openings, that the problem of disposing of the water was of vital importance. Many good mines were allowed to remain idle, solely because the expense of keeping them free of water was greater than the profits of operation. The first steam engine was built for a Cornish mine, the Wheal Por, by a Captain Savery, very early in the Eighteenth Century. It was but a partial success, and the plan was improved on by Newcomen, who erected a pumping engine at the Wheal Fortune mine, Cornwall, in 1720. The Newcomen steam engine was a crude and wasteful device, according to the standards of the present day, but it was much more effective than hand and horse power, or a water wheel, and was used in many of the larger Cornish mines for fifty years or more, until the genius of Watt brought forth the modern steam engine. It should be said, however, for Savery and Newcomen, that crude as were their engines, the pumping plan followed by them was essentially sound, and the Cornish pump, first made by Savery two hundred years ago, and improved a little later by Newcomen, remains the basic model for the Cornish mine pumps, scattered over the habitable world, wherever there are mines.

The first Watt engine, erected at Chacewater, Cornwall, in 1777, proved a great success, and came none too soon, as the larger mines, deepened by reason of the aid given from Newcomen's pumps, were at a depth

where the first crude engines no longer could give satisfactory results.

Although steam power was first applied to copper mining two centuries ago, it was used only for handling water until after the beginning of the Nineteenth Century. The first application of steam power to other mining uses was in the first or second decade of the Nineteenth Century, when a hoisting drum was first actuated by steam.

For the first half of the Nineteenth Century, Great Britain maintained its position at the head of the world's copper producers, but for British copper mines the latter half of the century was a period of ever increasing depression, relieved by only occasional years of prosperity. The invention of the Watt engine and its application to pumping machinery enabled the mine operators of Cornwall and Anglesea to penetrate to depths theretofore undreamed of. In 1790 the Dolcoath mine, in Cornwall, was 600 feet deep; in 1816 it was down 1,368 feet, and in 1830 the Tresavean mine, also of Cornwall, reached the great depth of 1,920 feet. As the mines increased in depth rapidly, various improvements became necessary. The old method of raising ore in baskets, carried up ladders on the backs of men and women, was replaced by whims, operated first by hand, then by horse power, later by water-wheels, and eventually by steam, the ropes that hoisted ore in wicker baskets being coiled around these whims. A little later the hempen ropes were replaced by wire cables, and the baskets gave way to iron skips and cages. In 1842 the first man-engine was built, for taking miners to and from their work in the deep shafts. Mine surveying was introduced, and machinery employed in the mills, where hand-work had been the rule for centuries. The Anglesea mines enjoyed great prosperity for the first quarter of the century, but gave unmistakable signs of exhaustion a few years later, and in the fourth decade ceased to be important factors in the world's copper industry. The smelters of Wales had attained such growth, however, that Swansea still remains the seat of one of the greatest and most diversified smelting industries of the world.

Apparently the first copper mining was done in Japan circa A. D. 700, but the industry did not become important until about A. D. 1600, and in the Seventeenth Century, more or less copper was exported to Europe, through the medium of the trading ships of the Dutch, who enjoyed a monopoly of Japanese trade, until the excesses of the traders and missionaries lead to the closing of the ports in Japan to all foreign trade, after which Japan was a sealed book to the balance of the world, until reopened by Commodore Perry, in 1854. In 1830 the production of Japan was about 4,000 long tons, and in 1874 was only 3,360 long tons, of which four mines furnished about half, and nearly 200 mines the other half, giving an average annual production of about 10 tons only for the smaller mines. Modern Japan may be said to date from 1869, when the Tokugawa government was deposed, and the Shogun was compelled to surrender his usurped power to the Mikado, the rightful ruler. The readjustment of internal political affairs occupied the attention of the Japanese, almost to the exclusion of other matters, for some years, but about 1880 the task of readjusting the ancient economy of the empire to modern environments was begun in earnest, and from that year, in which the first modern mining and smelting machinery was introduced to Japanese

of the rich stores of native copper in the Lake Superior district was known to the aborigines, and these mines had been worked by some prehistoric people that left considerable traces of their extensive operations. In 1882 Montana, now the largest copper producing district of the world, made its first production of the metal, and the beginnings of the great copper industry of Arizona were a decade earlier.

In British North America, Newfoundland opened its first mines of importance in 1865. A little mining of cupriferous pyrites was done shortly afterward in the Province of Quebec. Copper mining in the Province of Ontario begun with the opening of the Bruce Mines in 1846, but really important copper production dates only from the exploitation of the great nickel-copper deposits of Sudbury about 1886, and the large and promising copper industry of British Columbia had its inception in the last decade of the Nineteenth Century.

In Northern Africa the mining of copper ore, along the shores of the Mediterranean, dates from prehistoric times, but in Southern Africa the industry had its inception in the opening of the O'okiep mine, in Little Namaqualand, Cape Colony, in 1852, though copper had been discovered late in the Seventeenth Century by the Dutch settlers, and some fugitive efforts made in the direction of mining. The exploitation of the copper resources of Central Africa, still at an early stage of development, dates from the closing years of the Nineteenth Century and the same remarks hold true regarding the copper measures and mines of German Southwest Africa. The first recorded production of Australian mines was in 1844, and it is probable that in the future Australia will become a much more important factor in the copper market than has been the case in the past.

In Asia, copper mining and reduction, along very crude lines, have existed for unknown centuries, in China, India and Persia. The copper measures of China are of much promise, and this ancient empire, now awakening to the light of Twentieth Century civilization, doubtless will become a large producer of this necessary metal during the present generation.

The copper industry of the Twentieth Century may be said to date practically only from about the middle of the Nineteenth Century. Of the leading copper producing fields of the world, Lake Superior, Montana, Arizona and Utah, in the United States, were unknown in 1840. Mexico, which now holds second place as a producer, made no copper worth mentioning previous to the last quarter of the Nineteenth Century. The present great copper industry of Canada is so recent that all of its principal developments have occurred since 1880. The copper production of Australasia and South Africa date from about the middle of the Nineteenth Century, and production along modern lines, and on an important scale, in Chile, also began about 1850. Of the really important copper producing fields of the world, only Spain, Germany and Japan have a history that is not covered by the span of life of a man of three score and ten.

The beneficial influence of the copper industry upon the mining and metallurgical methods of the world has been most marked, and the copper industry has been well to the fore in the introduction of improvements. Gunpowder for blasting was first used at Frieberg, in 1610, and was

introduced at the Wheal Vor mine, in Cornwall about 1670. Steam for pumping and later for general use, was first introduced to mining at the copper properties of Cornwall. Wire rope and iron buckets for hoisting were first used in copper mining, and high explosives and power-drills for breaking rock were first used in the Lake Superior mines. The history of the metallurgy of copper for the past quarter century is almost coincident with the history of metallurgy as a whole for the same period.

Various attempts have been made to corner the production of copper since it became a metal of prime importance. The first attempt along these lines was made by the Associated Smelters of Swansea, which perhaps was the original copper trust. The Associated Smelters, which flourished from 1840 to 1860, was most arbitrary in its operations, buying as cheaply and selling as dearly as possible, and zealously guarding its smelting processes. The short-sighted policy of this association, in screwing prices of ore to the lowest possible figure, while advancing the price of the finished metal, aggravated by its arbitrary charges for draftage and moisture, and by the use of unfair assay methods, led to the establishment of independent smelters at or near the mines, in most of the principal copper producing districts, and effectually shattered the power of Swansea as the arbiter of the copper industry.

The second attempt at a copper corner was made by a group of French financiers, under the leadership of M. Secretan. The basis of this corner was the Société des Metaux, of Paris, formed 1877, which in February, 1887, became one of sixteen underwriters that organized the Secretan Syndicate, with a nominal capitalization of $13,587,000, eventually reduced to $10,718,500. Of this capitalization, the Société des Metaux held $2,910,000, and M. Secretan, personally, $2,328,000. The Comptoir d'Escompte, which then was second only to the Bank of France, among French financial institutions, became involved, first through guaranteeing purchases from the mines, and later through loaning funds to the Syndicate, originally upon the security of the metal itself, and latterly upon endorsements. The first step of the Secretan Syndicate was to secure control of the production of the Anaconda mine, in December, 1887, the Anaconda being, at that time, the largest copper producer of the world. This was followed shortly by the making of contracts with the Calumet & Hecla, Rio Tinto and other large mines producing at least 75 per cent., and probably as much as 85 per cent., of the copper output of the globe. At the end of August, 1888, the Syndicate had borrowed $24,825,000, and at the end of December, 1888, the Comptoir d'Escompte had loaned to the Syndicate the enormous sum of $33,368,000, of which only $16,878,000 was fully secured. The price of copper was advanced, speedily, by the Syndicate, from 11 cents to 17¾ cents per pound, this advance taking place within one month. Consumers, understanding the situation fully, reduced their demands to the lowest possible figure, and an immense amount of old copper was broken up and resmelted, the available supply of old copper proving vastly greater than had been anticipated by anyone, and forming perhaps the largest single factor in causing the downfall of the Secretan Syndicate.

Very early in 1899 the credit of the Syndicate was exhausted, and the Comptoir d'Escompte was so seriously involved that the manager

committed suicide, and the bank was saved with great difficulty, while the Secretan Syndicate was demolished utterly. Notice of the failure of the syndicate was followed by an immediate drop, from the market price of £100 per long ton of copper, and, in a single day, in the spring of 1889, copper dropped £70 to £35 per long ton. The bankers, who had loaned immense sums upon copper stored in bonded warehouses, decided to sacrifice their holdings, at any price that would enable them to realize upon their collateral, but, through the action of the Calumet & Hecla, backed by the Anaconda, which threatened to put the price of copper to five cents per pound, unless the bankers would spread the marketing of the surplus over a period of years, utter paralysis of the copper trade was averted. The accumulation of copper made by the Secretan Syndicate, in a period of about eighteen months, has been estimated variously, but may be set down safely at about 175,000 long tons. A period of four years was required to work off this accumulated surplus, which was marketed without serious disturbance to the trade, though entailing six years of low prices for the metal.

The third attempt at a copper corner was made in February, 1899, by the organization of the Amalgamated Copper Company, avowedly formed with the intention of controlling, first the American, and, later the world's copper trade. This corporation was organized with a controlling share interest in the Anaconda, and several other smaller mines of Butte, to which, two years later, was added the Boston & Montana mine. The Amalgamated Copper Co., operating through its sales agency, the United Metals Selling Co., maintained the price of copper at 17 cents per pound until October, 1901, when it was seen that a break in prices was inevitable, and at which time nearly 200,000,000 pounds of copper had been accumulated, this being owned mainly by the Amalgamated Copper Co., and by its subsidiary and affiliated producers. A panic in the copper market was precipitated by the action of the United Metals Selling Co., in making repeated cuts in the price of the metal, at regular intervals. The Amalgamated was credited, popularly, with the intention of cutting the price of the metal squarely in two, to 8½ cents per pound. This price was not reached, however, for the reason that several of the large independent producers, led by Phelps, Dodge & Co., aided by several of the largest American consuming interests, stepped in and bought up all of the surplus copper remaining in the market, at prices around 12 cents to 13 cents per pound.

Early in 1907 an effort was made, by strong interests, to form a combination to include the leading American producers, with a view to maintaining prices through regulation of marketing, and by restricting production if necessary, but this effort was frustrated by the stand taken by several leading independent producers of the United States.

Further and more detailed particulars regarding the history of mining and metallurgical developments will be found in the chapters devoted to metallurgy and to the copper deposits of the world, in addition to which detailed references to the history of individual mines will be found in the descriptions of many of the more important copper properties, contained in the long chapter devoted to copper mines.

CHAPTER II.

The Geology of Copper.

Merely an outline of geological features of interest pertaining to copper is attempted in this chapter. The subject is so great that many books of value have been written upon the matter by different authorities. From its very nature, geology is largely an empirical science, but the Twentieth Century geologist is a vastly better-fitted worker, in his chosen field, than his predecessor of even the preceding generation. The geological work of the Nineteenth Century, until well toward its close, was largely of a synthetical nature, but the new school of geology teaches, and with wisdom, that analysis must precede synthesis. As a consequence of this new spirit, great strides have been made in geological knowledge, and in the special field of copper, much work of a brilliant and highly valuable nature has been done during the few years of the present century. The work of Weed, Winchell, Kemp, Lindgren and other scientists of solid attainments and indefatigable industry has added greatly to our sum of knowledge of the geology of copper. The geologist, who was regarded, fifty years ago, by practical men, as belonging to much the same class of pseudo-scientists as the alchemist, has made for himself, through sound work, a safe place in the ranks of the technical men whose labors are of practical, as well as of theoretical value, to the world.

There is much diversity of opinion, on various important points, among the leading geologists of the present time, but out of this turmoil of argument and confusion, is arising a newer and a sounder knowledge of geology, not only in theory, but in its vital bearings upon the industry and civilization of the world, so fundamentally dependent upon an assured supply, at reasonable cost, of the important metals and minerals.

Rocks may be divided into three classes, these being igneous, sedimentary and metamorphic. The igneous rocks, fused in the bowels of the earth, and ejected by volcanic action, or oozing forth as magma from cracks in the earth's crust, may be divided into granitic, porphyritic, vitreous and tufaceous forms, this latter division including the tuffs ejected as scoriaceous material, by volcanic action. The sedimentary rocks were deposited by the action of water, usually on the beds of ancient seas. The detrital material so deposited formed conglomerate, shale, sandstone and limestone strata, and, in the case of the three forms first named, the material for sedimentary beds was obtained necessarily, mainly from the breaking down of the older igneous rocks. Strata of igneous and sedimentary rocks frequently alternate in the older geological groups. The third or metamorphic class of rock forms, consists of altered rocks of both the igneous and sedimentary forms, in which the phenomena of crystallization and replacement have been brought about since their formation

by the action of intrusive deposits of molten magma, and by the effects of percolating waters, whether meteoric or volcanic.

The ores of copper are described in detail in the chapter on chemistry and mineralogy, but some brief reference thereto is necessary in an outline of the geology of the metal. The principal copper ores of commercial importance may be divided into seven classes, as follows: Native copper, existing alone, or practically so, in the Lake Superior district, Bolivia and elsewhere, and occurring in the oxidized zone of mines of copper ore in almost every mineral field; oxide ores, including cuprite and melaconite; carbonate ores, including malachite and azurite; sulphide ores, of which chalcocite, bornite and chalcopyrite are the more important; chalcanthite, or sulphate of copper, occurring as an alteration product in many rich sulphide mines, and being the source of the copper secured by precipitation from cupriferous mine-waters; enargite, among the arsenides, and atacamite among the chlorides. In importance, the sulphide group is overwhelmingly preponderant, about three-fourths of the world's copper supply coming from ores of this class. Contrary to the opinion formerly held, chalcocite is a far more important source of copper supply than chalcopyrite, and bornite probably is but slightly behind chalcopyrite, as a source of copper supply from the sulphide ores. It is probable that chalcocite, which is the most important ore of copper, produces nearly one-half of the world's supply of the metal.

The copper ores are very showy, giving nearly every color of the spectrum, hence attract attention more readily than most ores of other metals, but nature has so deposited many of our most important stores of copper, as hereinafter described, that the outcrops first visible to the discoverer are merely rusty stains of hematite and limonite, both ores of iron, with colors ranging from yellow through brown to red, these outcrops occasionally carrying small quantities of green and blue copper carbonates.

The industrial metals known to man have varying affinities, this referring not only to their valencies, as determined by their position among the elements, but also referring to their preference for combining with other elements, and furthermore to their choice of neighbors, this latter depending, necessarily, largely upon the material available. It is found, however, in geological and mineralogical research, that certain groups of metals may be looked for in juxtaposition, under given circumstances. Gold, the king of metals, and platinum, scarcely the inferior of gold, hold themselves aloof from the common herd, and occur but rarely as ores. Silver is more democratic, and the common workaday metals are found commingled in a spirit of fellowship, but, as in the social fabric of man, there are certain family relations, and cleavage lines by which classes are formed.

Most copper deposits carry both gold and silver, usually in small quantities, but frequently in sufficient amounts to add materially to the gross values recovered, especially since the very general utilization of the electrolytic process for copper refining has made it possible to recover the precious metal values, practically without cost, while eliminating the impurities remaining in the blister copper turned out by the smelters. Lead and zinc are found very commonly in connection with copper ores,

the three sulphide ores of copper, lead and zinc, being closely affiliated, and iron, while rarely considered a commercial product of copper ores, is found in the great majority of copper mines, first as the iron hat, marking the outcrop of the vein, and in the lower workings of the mines, chemically united with copper and sulphur, as chalcopyrite, or, as is frequently the case, intimately, but mechanically, associated as chalcocite and pyrite, the sulphide ores respectively of copper and iron. Arsenic and bismuth also are common associates of copper, these being deleterious elements. Zinc also, mechanically mixed with many copper sulphide ores, is a damage, and its presence has prevented the successful development of many otherwise valuable copper mines. Only within the past few years has it become possible to mechanically remove zinc from sulphide copper ores, previous to smelting.

The more common metals, and frequently the rarer ones, are found as component parts of many ordinary igneous rocks, though commonly in such small quantities that these rocks cannot be considered as ores of even the lowest grade. There are notable exceptions to this rule, as in the case of the monzonite ore bodies of Bingham, Morenci and Ely, and it is probable that in the future other sources of copper supply, of the first magnitude, will be found in igneous rocks, in which the original cupriferous contents have been enriched by local action. The enrichment of the monzonite ore bodies referred to, seems to have been due to the shattering of the solidified upper portions of the cooled magma, containing originally a small quantity of magmatic copper concretions, followed by the precipitation of additional copper, in the form of chalcopyrite, from the heavily mineralized magmatic vapors rising into the shattered zone from the still molten mass below. This process may have been aided by later enrichment from percolating waters, which would tend, however, as a rule, to [illegible] the mineral values disseminated throughout the rock-mass, and [illegible] these values in fissures in the igneous rocks, or along the line of [illegible] with adjacent sedimentary or metamorphic rocks.

In the light of present geological knowledge, it seems probable that the original source of most of the present workable copper deposits was in chalcopyrite disseminated sparingly, in minute particles, throughout the magma of igneous rocks. From these disseminated particles of chalcopyrite, most of our copper ore bodies have been formed, either by magmatic segregation, in which the greater part of the ore values was concentrated usually at the point of contact with adjacent rock forms, or by [illegible] therefrom. Nature is much the greatest chemist and metallurgist now doing business, and the work of her laboratories and forges, although exceedingly slow, is upon a vast scale, and never ceases. The original ore values, contained originally in molten magma, have been [illegible] and redeposited, repeatedly in many cases, during the [illegible] that have elapsed since the work was begun, consequently [illegible] ores existing in a great variety of forms, and giving [illegible] plicated chemical reactions, as well as of long continued [illegible] centration.

In a complex magmatic intrusion, the edges of the [illegible] naturally cool first, through the radiation of heat to [illegible] In addition, the less soluble minerals are the first to [illegible]

having a greater affinity for sulphur than is possessed by any other metal, is one of the first minerals to crystallize out of the molten magma, as chalcopyrite. These facts afford an explanation of the occurrence of magmatic ore bodies along the point of contact between igneous intrusives and the rocks so intruded. Many of the best workable bodies of copper ore are found at or near the contact between granitic intrusions and sedimentary or metamorphic strata adjoining, occurring either as contact deposits, or, frequently, in fissures traversing either or both the igneous mass and the adjoining strata.

Many important bodies of copper ore occur as contact metamorphic deposits, at or near the contact between intrusive rocks and stratified formations. While the exact genesis of these ore deposits varies according to circumstances, and frequently remains somewhat obscure, the main point of magmatic segregation seems sufficiently plain, and much corroborative evidence has been brought to light by recent investigations. These deposits may be separated roughly into two classes, the first being products of simple metamorphism, with slight changes in ore bodies previously laid down, while the more important, and probably more common class, is attended by contact metasomatism, due to reactions caused by vapors and magma emanating from the intrusive rocks. Where such ore bodies are deposited in limestone, which frequently is the case, further alterations and reactions of prime importance have followed the cooling of the igneous rock, in many instances, the limestone offering an exceptionally suitable reagent, in connection with percolating waters, for further chemical changes in the nature of the ores.

Rain, falling upon the surface of the earth, carries small quantities of oxygen and carbonic acid gas, both weak solvents of many minerals. The weakness of the solvents has been fortified by the immense quantity of rain so falling, and by the lapse of untold millions of years, during which the process of leaching has been continuous. When attacking primary sulphide ores, such as chalcopyrite or pyrite, the water carrying oxygen and carbon dioxide in solution, eventually sets free an atom of sulphur, which, combining with the water, forms a dilute sulphuric acid, very weak to be sure, but a much more powerful solvent than carbonic acid gas or oxygen, and the weak sulphuric acid solution reattacks the sulphide ores, gradually breaking them down, and taking them into solution, and they are redeposited, at suitable points, lower down, as enriched sulphides, carbonates and oxides, and occasionally as native copper. The synthesis of most of the important ores of copper has been fairly established by extended and successful laboratory reactions.

The important part played in ore deposits by water is now acknowledged by all geological authorities. In fact, it is a question if the importance of the work done by water in forming commercial ore bodies is not over-rated by some geologists. While the work of water in laying down ore bodies is generally acknowledged, there are considerable differences of opinion as to whether deposition has come mainly from waters of meteoric or of volcanic origin, and also whether the ore was deposited mainly from descending or ascending waters. There seem excellent grounds for believing that both descending and ascending waters have played very important parts in depositing mineral values. The rains that fall upon

the surface of the earth sink into the rocks to great depth, there being practically no rock formations that are impervious, though the degree of permeability varies greatly. For all practical purposes the rocks composing the earth's crust may be considered permeable by water to the depth where increased temperature vaporizes it. That percolating meteoric waters have been responsible for a considerable proportion of the ore bodies now in existence seems reasonably assured, but that the meteoric waters have been, in many cases, greatly assisted by terrestrial waters, ascending from great depth, strongly charged with metallic solutions, also seems a hypothesis fully warranted by known facts. The terrestrial ascending waters naturally would possess the advantage of heat, to a degree adding greatly to their natural solvent power, and the pressure existing at great depths also would add largely to the solvent power of such waters.

In addition to the primary force of magmatic segregation, and the secondary force of waters carrying minerals in solution, there are other genetic forces of lesser, but by no means negligible importance. That organic matter has played a considerable part in the precipitation of copper minerals is shown plainly in numerous instances. There also is a theory, now in rather general discredit, that metallic values have been precipitated by electro-chemical action, from sea-water. The water of the ocean contains a very small quantity of copper, probably less than one grain in one hundred cubic meters, but, in the aggregate, the seas hold an enormous amount of this metal. Apparently the sea was the source of the metal found in cupriferous shales at many points on the earth's surface, and there is corroborative evidence that the native copper found in the Keweenawan belt of Lake Superior may have been precipitated in metallic form by the action of sodium chloride, the ferrous condition of the small quantities of iron found associated with this native copper seeming to substantiate this view.

Another theory, once widely held, but now in general disfavor, is that the metals were deposited by electrical action. In all likelihood, electricity, which seems but another name for all energy, whether dynamic or static, was not devoid of power in the great work of concentrating mineral values from the original disseminated particles contained in rock magmas, to the point of sufficient richness to be available for the uses of man.

As evidence of the truth of the hypothesis that mineral values have been deposited from heated ascending waters is furnished at a number of points on the earth's surface by hot springs, that are now depositing copper in small quantities. Not the least interesting of these is a hot spring in Java that carries in solution copper iodide, which is concentrated and produced commercially on a small scale.

Clays possess the power, through adsorption, of extracting metals from wonderfully dilute solutions, and it has been ascertained that all clay-rocks are more or less cupriferous, though usually valueless as ores. Copper is a peculiarly soluble metal, in most of its compounds, which are readily associated with iron sulphides, hence easily attacked by oxidizing waters. Carbonaceous and organic matters are powerful reagents, and lead to numerous reactions, in connection with the oxygen, carbon dioxide and dilute sulphuric acid found in underground waters.

Copper, nickel and cobalt are found frequently in basic gabbros, in many parts of the world. The Lake Superior traps are of this class, as a rule, and copper, in small amounts, is found as impregnations in dense dioritic rocks, and in uncomformable adjacent sandstone of a later geological horizon, near the point of contact, where there are some evidences of metamorphism. The home of the Lake Superior copper, however, is in the metamorphic amagdaloidal traps and conglomerates, and in the sandstones of the upper Keweenawan series. Native copper is found frequently in greenstone, as in the amygdaloids of Lake Superior, in the Nicholai deposits of the Copper River district of Alaska, in the melaphyrs of Newfoundland, in Amador and Calaveras counties, California, and at a number of other points.

Various classes of copper ore deposits are found, these including magmatic segregations, metamorphic contact deposits, fissure veins and deposits formed by percolating waters and mineralized vapors, replacements, sedimentary deposits, and impregnations in sandstones, tuffs, conglomerates and breccias. While these various classes of deposits are distinct, in theory, and usually distinguishable in practice, the lines between individual deposits are extremely difficult to draw in some cases.

While some ore bodies are entirely covered by flows of later geological age, and while some of the contact deposits in stratified rocks, notably in limestone, show very small outcrops, as a rule there are strong surface indications of cupriferous values at depth. Occasionally the unaltered sulphide ores outcrop at surface, as in the case of deposits of disseminated chalcopyrite in the Algoma district of Ontario and elsewhere, and in the instance of the magnificent surface croppings of massive bornite, chalcocite and chalcopyrite found in the Copper River district of Alaska, the latter probably being the richest outcrops ever discovered. As a rule, however, a copper-bearing fissure vein or contact deposit shows a gossan, or iron hat, this deriving its color of rusty yellow, brown or red, from iron in the form of hematite or limonite. The gossan may, and frequently does, show copper ore, usually as carbonates, either both malachite and azurite, or more commonly, the green carbonate alone, and occasionally there are other oxidized copper ores shown in the gossans, but, as a rule, these carry but small copper values, and rarely can be considered commercial ores of copper, though in numerous cases the gold contents are sufficient to warrant their working as gold mines. In fact, many mines have been opened for gold that really contained immensely greater values in copper, at depth, and there are frequent instances of gold mines turning into copper mines at depth, the most recent example of importance of this change in metallic values being afforded by the Mount Morgan mine, of Queensland, Australia, for many years one of the largest gold producers of the world, and now a copper mine of great value, at a depth of 1,000 feet or more.

Frequent reference is made to the silver mines of Butte turning into copper mines at depth, but this is somewhat misleading. The first mines at Butte were silver properties, and there seems good reason to believe that some of these may turn into copper mines at great depth, but, as a matter of fact, the silver mines were opened on an entirely different set of veins than those carrying the wonderful copper values for which

Butte is famed, and the discovery of the copper mines was due to cross-cutting, at depth, from the mines on the silver veins, as the copper veins contain practically no values for 500 to 1,000 feet depth from surface. Some of the greatest ore bodies at Butte have no gossans, and surface indications are most meagre, not being sufficient to justify the expense of exploring, in an unproven district.

Examples of silver-lead mines turning into copper properties at depth are fairly numerous in Utah, Mexico and elsewhere, probably the best examples being furnished by the mines of the Bingham district of Utah. At Leadville, Colorado, the zinc ores of the upper workings are being replaced by copper at depth.

In the majority of cases the outcrops of copper ore bodies are leached, and, in such cases, only infrequently give workable values in copper at surface, though, as before stated, there are numerous instances of gossans carrying workable gold values, causing the opening of gold mines that at depth have turned into copper mines.

As chalcopyrite, which may be considered the original form of copper ore, carries one atom of iron, and one of copper, held together by two atoms of sulphur, the breaking up of the granule of chalcopyrite not only releases copper, for redeposition in the form of an enriched sulphide, or as a silicate, carbonate or oxide ore, but also releases the atom of iron, which may be carried upward or downward, or left in place, and which usually appears as hematite, the sesquioxide of iron, or as limonite, the hydrated sesquioxide, disseminated through the outcrop of the vein. This is the gossan or iron hat, a welcome sign of probable copper values below, in nearly every copper mining district of the world. It is not, however, an invariable indication of workable values at depth, and there are numerous instances where fine gossans, of the most promising appearance, have proven deceptive as to values carried in the vein beneath. These gossans also have the bad habit of spreading beyond the limits of the walls of the vein below, through lateral surface filtration, and occasionally a wide gossan covers a narrow vein. At other points the original gossan has been removed by surface erosion, or by glacial action, but, as a rule, a good gossan means at least a fair chance of a good mine beneath.

The depth of gossan cappings varies greatly, according to local circumstances, occasionally being merely superficial, but sometimes extending to the water level. In the case of a typical cupriferous fissure vein with a typical gossan, the iron capping is succeeded by a leached zone, and where the leaching has been long continued and thorough, and erosion light, the mineral values have been removed, almost completely, from the leached zone, to be redeposited at greater depth. In other instances, the leaching has been less thorough, and copper values, usually small, remain in the leached area. The depth of the leached zone varies greatly, according to the circumstances following the first deposition of the ore, and occasionally the leached zone is of great depth, as at Butte, while elsewhere it is comparatively shallow, and sometimes is lacking entirely. The great depth of the leached zone in Butte, and the great depth and richness of the succeeding zone, afford evidence in support of the palpable hypothesis that, under average circumstances, the greater the depth of leaching, the greater the quantity of secondarily enriched ores to be found below.

The typical cupriferous fissure vein may be divided into five zones. The upper is the iron hat or gossan outcrop, succeeded by the leached zone. The third zone is that of oxidized ores, carrying rich oxides and carbonates, and occasional silicates and chlorides, followed immediately by the fourth zone, carrying enriched secondary sulphides, such as chalcocite and bornite, with occasional covellite. The limits between the zone of oxidized ores and that of enriched sulphides are not always clearly defined, and these two zones frequently are considered as one, under the name of the zone of secondary enrichment. It is, however, possible to draw a rough line of demarcation between the oxidized ores above and the enriched secondary sulphides below, in this so-called zone of secondary enrichment, in most cases. The source of the copper in the enriched zone is, of course, the values leached from the vein above, and here redeposited. The depth of the zone of secondary enrichment varies enormously, being dependent upon a considerable variety of factors, including the average percentage of copper in the original vein, the depth to which leaching has been carried, the amount of surface erosion, and the time that has been consumed. In some of the mines of Butte the zone of secondary enrichment is of tremendous depth, a strong vein of massive chalcocite having been found at a depth of 2,400 feet in one of the Anaconda mines.

In the fifth or final zone, the ore is chalcopyrite, sometimes massive, but more commonly disseminated, and usually associated with pyrite, or chalcocite in thin films, as coatings on grains of pyrite. In this zone, values gradually decrease with depth, until the vein pinches out, or, as is more commonly the case, carries lessening values that lead to the abandonment of the property as unpayable.

Bonanza ores in the zone of secondary enrichment sometimes hold to great depth, but, usually are comparatively shallow, the most important exception to this rule being in the case of the deep mines at Butte, previously referred to. The zone of secondary enrichment sometimes carries silicate and chloride ores of copper, as the results of various reactions. Where the unaltered ores in the final zone are argentiferous, copper ores rich in silver occur in the zone of secondary enrichment. Copper ore bodies frequently carry the native metal in the zone of secondary enrichment, where crystals of cuprite shade into crystals of native copper. Masses of native metal of hundreds, and even of thousands of pounds in weight, occur in many of the well-known copper ore mines, but such masses of native metal must be held radically distinct in genesis from the native copper of Lake Superior.

The influence of wall-rocks seems of considerable weight in determining the nature of secondary deposits. Where the wall-rocks are silicious, the products of secondary enrichment, in the sulphide zone, usually are chalcocite and occasionally covellite, while limestone walls are apt to give more or less chrysocolla in the oxidized zone. Chalcocite is especially liable to occur in veins traversing silicious rocks, but frequently is found in considerable quantities in limestone deposits. The copper and tin deposits of Cornwall afford an interesting field for speculation in this connection. According to the best authorities, these metals were given off from granitic magmas, in the form of gases, heavily laden with metallic vapors, which deposited the tin and copper in the same veins, but with a

fairly sharp line of demarcation, the copper occurring mainly in those portions of the fissures that traverse slate, while tin usually occurs in granite.

The most common gangue of copper ore is quartz, which also is true of many other metals. Calcite and spathic iron ore frequently are found also, and occasionally barite. Very commonly the gangue is merely altered country-rock.

All copper ore bodies, including the native copper mines of Lake Superior, notwithstanding a general impression to the contrary, show decreased values at great depth. The exact depth at which the permanent decrease begins depends, necessarily, upon many factors, and no general rule, other than the one herein laid down, can be predicated.

Deposits of copper ore, of size and tenor sufficient to warrant ranking them among commercial ore bodies, may be considered, as to occurrence, by three widely differing methods of grouping. The first of these is geographical, and, while, for commercial reasons, the geographical occurrence of copper is of prime importance, and is treated of fully in later chapters covering the entire world, under the title of Copper Deposits, such a grouping is essentially commercial, and by no means in accordance with geological rules, for the reason that the geographical divisions of the earth have been made by man, hence rarely correspond with the geological divisions made by nature. The two other methods of grouping occurrences of ore may be termed the method of geological horizons, and the lithological plan. It is necessary, in order to afford even an outline of the geology of copper, to give brief consideration to occurrences grouped under both of the latter-named headings. Viewed by geological ages, it is noted that copper deposits occur in rocks of practically all periods except the Quaternary, but the ore bodies are mainly post-Cretaceous deposits of Devonian and Carboniferous ages, laid down in rocks of those or of previous ages. The Permian veins throughout the world are notably cupriferous, and furnish a number of mines, though many of the Permian beds are too low in copper tenor to be considered as available deposits, at the present time, though doubtless these will have their place in the economy of future generations. The rocks of the Permian age, and the Jura-Trias system of the Mesozoic, or age next younger than the Permian, are more uniformly cupriferous than those of any other period, but are apt to carry disseminated ores of very low copper tenor, and these are workable only in occasional spots of exceptional richness, usually due to local enrichments caused by igneous intrusives. While the percentage of copper in the Permian and early Mesozoic beds is small, the aggregate of copper so deposited is past computation, owing to the dissemination of the ores through beds of vast area.

Viewed from a lithological standpoint, workable ore deposits occur mainly in igneous areas, most usually at or near the point of contact between igneous intrusive rocks and stratified beds, limestone being the most common form of the latter, but a number of the largest deposits now worked, including those of Lake Superior, Butte and Mansfield, are of other classes. Very many of the principal copper deposits now worked are closely connected with intrusive granite rocks, of post-Cretaceous age. Like most workable deposits of practically all other metals found in place, copper occurs in mountain ranges, perhaps more frequently in

flanks or the foot-hills than in the higher peaks. In frequent instances, as in the Lake Superior deposits, copper is found in the roots of very ancient mountain ranges that have been quite thoroughly eroded. Many of the largest copper deposits are found at or near the point of contact between igneous intrusives and other rock forms, leading necessarily to the assumption that the metallic values were contained originally in the granitic magma, and either were deposited as magmatic segregations, at or near the point of contact, or, as is more commonly the case, were leached from the magma and redeposited as concentrated ore in fissures and limestone cavities, or as impregnations in permeable rocks. Primary ores usually are associated with basic rocks, or may be contact deposits of igneous acid rocks, but the secondary ores may occur in any adjacent rock strata offering a place for their deposition.

There are occasional occurrences of magmatic copper ores not existing as segregations distinct from the magma, though such deposits offer evidences of strictly local segregation, but most of these cases are of scholastic rather than of commercial importance. Exceptions must be made, however, in the instances of the wonderful monzonite ore bodies of Bingham, Utah, and of Ely, Nevada, and of a portion of the deposits of Clifton and Morenci, in Graham county, Arizona. It is probable that in the future greater attention will be paid to the possibilities of discovering similar porphyritic ore bodies containing magmatic ores, low in copper tenor, to be sure; but immensely valuable because of the almost unlimited quantity of such ore that may be found to occur in a single deposit.

The districts carrying copper in sedimentary formations are low in copper tenor as a rule, but more extensive in area than those fields carrying copper in igneous and metamorphic rocks. The Mansfeld district of Germany covers about two hundred square miles, and the Permian formation of the Ural Mountain range, that separates Russia and Siberia, is very extensive on both flanks, covering several thousand square miles. The Lake Superior copper district is of an exceptional nature, and of unusual extent, having a known length of about 400 miles, from Michipicoten Island, on the east to Pine and Chisago counties, only a short distance north of Minneapolis and St. Paul, on the west, but nearly half of this distance is submerged under Lake Superior, between the western end of Michipicoten Island and the eastern tip of the Keweenaw Peninsula. The present limits of exploitation include a strip of about 100 miles only in length, the Keweenawan series having a width of 2 to 8 miles, and being flanked by beds of sandstone.

Copper is found in practically every class of mineral deposit known to miners, and, in Alaska, and elsewhere, occurs as native stream metal. Copper deposits of more or less value are found in nearly every country on the globe, but many of these are not of sufficient value to justify present working, though what the future may have in store, when the world demands more tons of copper yearly than it now requires tons of pig iron, the best of prophets scarcely could foretell. Copper ores frequently occur in lenticular form, some lenses, as in the case of the Rio Tinto mine, being of immense size, but some of the ore deposits formerly classed as beds are now rated, in view of later and more exact knowledge, as veins.

In the commercial exploitation of copper ore bodies, one of the most

common and most fatal of errors is in attempting to base the future of the mine upon the rich and easily smelted ores of the zone of secondary enrichment. The wise management endeavors to learn the nature and extent of its ore bodies at depth, before building large and costly reduction plants of a permanent nature. When a mine is already opened in rich copper ores, sinking always is a good policy. Only by sinking to depth can the future of the mine be predicated with safety, and only by determining the different kinds and grades of ore, and the proportions in which they exist, can permanently satisfactory reduction plants be planned and installed.

Detailed information regarding the distribution of copper ores throughout the globe, with numerous detailed references to the geology of copper, will be found in the various chapters devoted to the geography of the metal. Geological particulars regarding individual mines also will be found scattered through the long chapter devoted to detailed mine descriptions.

The foregoing matter in this chapter is intended merely as an outline, and is not put forth as infallible in any particular, being merely the best judgment of the author, deduced from such limited studies of ore deposits as he has been able to make personally, amplified by the more detailed and valuable studies of many better authorities. For those who wish to make more careful investigation into the subject of ore deposits, and the geology of copper, I would recommend the perusal of Weed's Copper Mines of the World. While not holding with Mr. Weed on all points, the author of this brief monograph bears witness, cheerfully and gladly, to the vast amount of patient and well-considered investigation of details that has been made by Mr. Weed, and his exposition of the genesis and occurrence of copper ores, while by no means representing the last possible word in so vide a field, where so much remains to be learned, is much the most luminous and satisfactory of anything yet put forth in this particular line. The searcher after truth would do well also to read Kemp's Ore Deposits of the United States and Canada, and in this connection the monographs of Winchell, Lindgren and Sperr are worthy of the most serious consideration.

CHAPTER III.

Chemistry and Mineralogy of Copper.

In this chapter is given a brief outline of pertinent facts regarding the chemistry and mineralogy of copper, ending with an alphabetical list of copper minerals, which will be found to include a considerable number not mentioned in any other work. Despite the appreciable length of this chapter, no attempt has been made to render it exhaustive, as such an effort would, of necessity, include a long treatise on general mineralogy, which not only would be out of place in a work of this nature, but which, even were the ability at command, has been done to such excellent purpose by two generations of scientists of one family that Dana's System of Mineralogy stands, as it long has stood, the world's authority in the special field of mineralogy. To the average reader this chapter will give sufficient detail, and may be found of some interest to all who are especially interested in copper, while those desiring to make a serious study of the subject are referred to Dana's monumental work.

The elements with which copper unites most readily are sulphur, oxygen, carbon, silicon, arsenic, antimony, bismuth and chlorine. Among the other metals, iron is the most common associate of copper. Many copper ores are more or less argentiferous, and sulphide copper ores frequently carry gold, though gold is not found in chemical combination with copper.

Following is a list of the 36 elements with which copper has been found chemically united in nature. Following the full name of each element is its chemical symbol and atomic weight, as now figured by the best authorities.

Element	Symbol	Atomic weight.	Element	Symbol	Atomic weight.
Aluminum	Al	27.	Nickel	Ni	58.6
Antimony	Sb	120.	Niobium	Nb	93.7
Arsenic	As	74.9	Nitrogen	N	14.
Barium	Ba	137.	Oxygen	O	16.
Bismuth	Bi	207.5	Phosphorus	P	31.
Calcium	Ca	39.9	Platinum	Pt	194.3
Carbon	C	12.	Potassium	K	39.
Chlorine	Cl	35.4	Selenium	Se	78.9
Chromium	Cr	52.5	Silicon	Si	28.
Cobalt	Co	58.7	Silver	Ag	107.7
Copper	Cu	63.2	Sodium	Na	23.
Hydrogen	H	1.	Sulphur	S	32.
Iodine	I	126.5	Tellurium	Te	125.
Iron	Fe	55.9	Tin	Sn	117.4
Lead	Pb	206.4	Tungsten	W	183.6
Magnesium	Mg	24.	Uranium	U	240.
Manganese	Mn	54.8	Vanadium	V	51.1
Mercury	Hg	199.8	Zinc	Zn	65.1
Molybdenum	Mo	96.			

The ores of copper (alone or with other metals) may be grouped in the following groups:

antimonides	iodides	sulphostannates
antimonites	manganates	sulphotungstates
arsenates	molybdates	sulphovanadates
arsenides	niobates	sulphovanadites
arsenites	nitrates	sulphates
arsenoantimonites	oxides	sulphides
arsenobismuthites	oxychlorides	sulphotellurides
arsenophosphates	phosphates	tellurides
bismuthides	phosphochromates	tungstates
carbonates	selenides	uranates
chlorides	selenites	vanadates
chlorosulphates	silicates	

While the appended alphabetical list of copper minerals gives nearly a hundred titles, the more important ores are scarcely more than a dozen in number, though many of the minor minerals are of local importance in certain fields.

The sulphide ores are of predominant importance. Chalcopyrite, the lowest in copper tenor, is the most common, being found in practically every copper field. The major production from sulphide ores is, however, from the rich chalcocite or copper glance, which is the alteration product of chalcopyrite in the ascending scale of copper sulphide ores, is a valuable ore, and is found in large quantities in many copper fields. Covellite, the next richest sulphide above bornite, occurs in connection with bornite and chalcocite in most sulphide deposits, but as a rule does not occur in large quantities, though in the Rio Tinto mines and in a few fields, as in Utah and Wyoming, it is found in quantities of considerable commercial importance. There are numerous complex copper sulphides and copper-iron sulphides that are found in quantities of confusion, but many of these greatly resemble the more common ores previously noted, and rarely are differentiated in ordinary determinations. There are a number of copper sulphates of which chalcanthite is the only important ore. While found in natural beds of this mineral, it is, as a rule, essentially a joint product of man and nature, the copper in sulphide ores made by man being leached out by sulphuric acid, soluble, and the copper contents easily precipitated. Much copper is secured, in many districts, by leaching the ores in vats of limestone, and in Spain a large part of the copper output is secured in this form.

Next in commercial importance after the sulphides are the native copper. This is mined very extensively in the Lake Superior region, on a considerable scale in Bolivia. Native copper is found in the workings of most rich mines of copper ores, and the total production from it is quite large.

Third in importance come the oxidized ores. Cuprite and malachite are the only ones usually found in quantity, though copper malachite is of much the greater importance. Cuprite, found in the upper or oxidized zone of copper deposits, and easily smelted, is the source of a large part of the world's copper supply.

The copper oxides usually are found in connection with the carbonates, and are mined and smelted therewith, being rich and easily reduced. Cuprite is the richest of all copper ores, but melaconite is far more common.

The only important commercial ore among the copper silicates is chrysocolla. This occurs frequently, and in considerable quantities, with the oxidized ores of many mines, and also is found disseminated in low-grade ore bodies at many points. It is probable that a larger proportion of copper will be secured, eventually, from silicate ores, perhaps by leaching processes.

The arsenical ores are common, but as a rule are present in just sufficent quantities to interfere with smelting. In Butte, Montana, enargite is a highly important copper ore, and is handled with signal success. In Chile and Perú arsenical ores are found in large quantities. Tetrahedrite, which shades by almost imperceptible gradations into tennantite, is a fairly common ore, but is not regarded with favor by miners, unless carrying considerable quantities of silver, which frequently is the case, the presence of both arsenic and antimony, frequently with bismuth added, rendering it difficult of smelting. Formerly the metal produced from gray copper ores was so poisoned with arsenic, antimony and bismuth, all deleterious elements, that such copper was suitable for only the roughest and cheapest of uses to which the metal could be put, but the general adoption of the electrolytic refining process has provided a way for eliminating these undesirable elements from the copper produced from gray ores.

In Chile considerable copper is secured from chloride ores, mainly atacamite.

An alphabetical list of copper minerals, including native copper and synonyms, is appended.

ACICULITE. Aikinite.

ADAMITE. A hydrous basic zinc arsenate, in which copper sometimes replaces zinc to the extent of circa 18%.

AGUILARITE. An unnamed alternation product of aguilarite has the formula $5(Ag,Cu)_2S.(Sb,As)_2S_3$. The mineral, which is a arsenosulphoantimonite is isometric.

AIKINITE. $3(Pb,Cu_2)S.Bi_2S_3$. A lead and copper sulphobismuthite, carrying 11% copper. Common names needle ore, acicular bismuth. Crystallization, orthorhombic. Fracture, uneven. Hardness, 2 to 2.5. Gravity, 6.1 to 6.8. Lustre, metallic. Color, blackish lead-gray, tarnishing to pale copper-red. Fuses on charcoal and is soluble in nitric acid. Occurrence, Ural Mountains of Russia and Gold Hill, North Carolina.

ALASKAITE. An argentiferous and cupriferous variety of galenobismutite, which is a lead sulphobismuthite, carrying 3.5 to 5.1% copper.

ADGODONITE. Cu_6As. A copper arsenide carrying 85.5% copper. Structure, massive and granular. Fracture, subconchoidal. Hardness, 4. Gravity, 7.62. Lustre, metallic on fresh fractures, dulling on exposures. Color, steel-gray to silver-white on freshly polished surface. Is less fusible than domeykite. Occurs in Chile and Lake Superior, in the latter district being found in cross-courses traversing the cupriferous beds of the South Range mines, causing the copper product to be highly arsenical.

ALISONITE. $3Cu_2S.PbS$. A copper and lead sulphide, carrying 53.5% copper, and 28.5% lead. Is related to cuproplumbite. Structure, massive. Color, deep indigo-blue, quickly tarnishing. Occurs at Coquimbo, Chile.

AMMIOLITE. Formula undetermined. A mercury and copper antimonite, carrying circa 12.5% copper. Occurs, as an earthy powder, in Chile.

ANDREWSITE. Formula undetermined. A hydrous iron and copper phosphate related to chalcosiderite, containing circa 8.6% copper.

ANNIVITE. A bismuthiferous variety of tennantite, from Switzerland.

ANTIMONIAL COPPER. Common name for chalcostibite.

ANTLERITE. Formula probably $10CuO.3SO_3.7H_2O$. A basic copper sulphate, containing circa 54.7% copper. Structure, massive. Gravity, 3.93. Color, light green. From Yucca, Mohave county, Arizona.

APHANESITE. Clinoclasite.

APHTONITE. An argentiferous and zinciferous variety of tetrahedrite.

ARNIMITE. $5CuO.2SO_3.6H_2O$. A hydrous basic copper sulphate, containing 47.6% copper. Occurs in acicular crystals.

ARSENICAL COPPER. Domeykite.

ASPEROLITE. $CuSiO_3+3H_2O$. A hydrous copper silicate. Apparently a hydrated chrysocolla, from Tagilsk, Perm, Russia.

ATACAMITE. $CuCl_2.3Cu(OH)_2$. A hydrous copper oxychloride, containing 60.5% copper. Crystallization, orthorhombic. Fracture, conchoidal. Tenacity, brittle. Hardness, 3 to 3.5. Gravity, 3.75. Lustre, adamantine to vitreous. Color, emerald green to blackish green. Streak, apple-green. Is transparent to translucent. Occurs, as sandy granules, in numerous mines in the province of Atacama, Chile, and elsewhere. Usually occurs disseminated, and low in copper tenor, but is extensively mined in Chile.

ATELITE. $2CuO.CuCl_2.3H_2O$. A hydrated copper oxychloride. An alteration product from Mt. Vesuvius, closely related to atacamite chemically and mineralogically, but occurring as a pseudomorph after tenorite.

ATLASITE. A copper carbonate containing chlorine, from Chañarcillo, Chile. Apparently is merely an intimate mixture of azurite and atacamite.

AURICHALCITE. $2(Zn,Cu)CO_3.(Zn,Cu)(OH)_2$. A basic zinc and copper carbonate, containing 16.6% copper. Crystallization, probably monoclinic. Occurs in acicular crystals, forming drusy incrustations, also columnar, laminated and granular. Hardness, 2. Gravity, 3.5 to 3.6. Lustre, pearly. Color, pale green to sky-blue. Streak, light green to light blue. Is translucent. Is soluble in acids. Occurs in small quantities in many zinc and copper fields.

AZURITE. $2CuO.2CO_2.H_2O$. A basic, copper carbonate, containing 55.3% copper. Common names, blue carbonate of copper, blue malachite, azure copper ore. Crystallization, monoclinic. Fracture, conchoidal. Tenacity, brittle. Hardness, 3.5 to 4. Gravity, 3.77 to 3.83. Lustre, vitreous. Color, azure blue. Streak, lighter blue. Is subtranslucent to transparent. Is soluble in nitric acid. Occurs frequently in the oxidized zone of copper ore bodies, almost invariably with malachite, but is much less common than malachite. Is a valuable commercial ore of copper.

BARNHARDTITE. Formula uncertain. A copper and iron sulphide, probably an alteration product from chalcopyrite that has lost part of its iron and copper, containing 46.7 to 50.4% copper. Apparently is nearer to bornite than to chalcopyrite. Structure, massive, compact. Fracture, conchoidal. Hardness, 3.5. Gravity, 4.5. Lustre, metallic. Color, bronze-yellow, tarnishing to pinchbeck-brown. Streak, grayish black, slightly shining. Occurrences, North Carolina and Arizona.

BARRACANITE. Cupropyrite.

BAYLDONITE. $4(Pb,Cu)O.As_2O_5.2H_2O$. A hydrous basic lead and copper arsenate containing 26.1% copper. Occurs in minute mamillary concretions with drusy surface. Fracture, subconchoidal. Hardness, 4.5. Gravity, 5.35. Lustre, resinous. Color, grass-green to blackish green. Streak, apple-green. Is subtranslucent. Soluble, with difficulty, in nitric acid. Occurs in Cornwall, England.

BEAUMONTITE. A very doubtful hydrous copper silicate, from Chessy, France.

BELL-METAL ORE. Common name for stannite.

BERZELIANITE. Cu_2Se. A copper selenide containing 61.6% copper. Occurs disseminated in incrustations. Is very soft. Gravity, 6.71. Lustre, metallic. Color, silver-white, soon tarnishing. Streak, shining. Usually is argentiferous. Occurs in Småland, Sweden.

BEUDANTITE. Apparently this name is applied to two minerals, one an arsenate and the other a sulphate of iron, lead and copper, carrying from a trace to 9.8% copper.

BINNITE. Formula probably $3Cu_2S.2As_2S_3$. A copper sulphoarsenite, containing 37.7% copper. Crystallization, isometric. Fracture, conchoidal. Tenacity, brittle. Hardness, 2.5 to 3. Gravity, 4.47. Lustre, metallic. Color, dark steel-gray to iron-black. Streak, reddish brown. Occurrence, Binnenthal, Switzerland.

BLACK COPPER. Common name for melaconite or disseminated chalcocite. In all likelihood much of what has been taken for melaconite in the past was disseminated chalcocite.

BLUE COPPER. Common name for azurite.

BLUE MALACHITE. Common name for azurite

BLUESTONE. Common name for chalcanthite; also for blue vitriol, the manufactured product corresponding in chemical formula with chalcanthite.

BLUE VITRIOL. Common name for chalcanthite or bluestone.

BOGOSLOVSKITE. Chrysocolla carrying carbon dioxide as an impurity, from the Bogoslovsk mine, Perm, Russia.

BOLEITE. $(Pb,Cu,Ag)Cl_2OH_2$. A hydrated lead, copper and silver oxychloride, containing circa 12% copper. Crystallization, isometric. Hardness, 3 to 3.25. Gravity, 5.08. Color, indigo-blue. Occurrence, at the Boleo mines, Baja California, Mexico.

BORNITE. Cu_5FeS_4. A copper and iron sulphide, containing 55.5% copper, 16.4% iron, 28.1% sulphur. Common name, peacock copper ore. Crystallization, isometric, with many hexagonal penetration twins. Struc-

ture, granular or compact. Fracture, small conchoidal to uneven. Tenacity, brittle. Hardness, 3. Gravity, 4.9 to 5.4. Lustre, metallic. Color, copper red to bluish brown, quickly tarnishing to iridescence, often most brilliant. Streak, pale grayish-black. Is soluble in nitric acid, with separation of sulphur. Is the first alteration product from chalcopyrite among the secondary copper sulphides, and often carries nodules and occasionally larger masses of chalcocite. Is one of the most important ores of copper.

BOTALLACKITE. Atacamite.

BOURNONITE. $3(Pb,Cu_2)S.Sb_2S_3$. A lead and copper sulphoantimonite, containing 13% copper, and 42.5% lead. Crystallization, orthorhombic. Structure, massive, granular and compact. Cleavage, imperfect. Fracture, subconchoidal to uneven. Tenacity, rather brittle. Hardness, 2.5 to 3. Gravity, 5.7 to 5.9. Lustre, brilliant metallic. Color and streak, steel-gray, inclining to blackish-gray or iron-black. Fuses easily on charcoal and is soluble in acids. Occurrence, in many copper fields.

BRASS ORE. Common name for aurichalcite.

BROCHANTITE. $4CuO.SO_3.3H_2O$. A basic copper sulphate containing 56.2% copper. Crystallization, orthorhombic. Fracture, uneven. Hardness, 3.5 to 4. Gravity, 3.9. Lustre, vitreous. Color, emerald-green to blackish green. Streak, paler green. Is translucent to transparent. Is found in many copper fields, and is an important commercial ore in the Clifton district, Graham county, Arizona.

BURATITE. An aurichalcite containing calcium monoxide, probably as a mechanical admixture.

CACHEUTAITE. A lead, copper and silver selenide carrying 7 to 36% copper. Is closely related to zorgite.

CALCIOVOLBORTHITE. $4(Cu,Ca)O.V_2O_5.H_2O$. A hydrous basic copper and calcium vanadate, containing 31.7% copper. Hardness, 3.5. Gravity, 3.5 to 3.86. Color, gray to green. Streak, brownish yellow to greenish yellow. Occurrence, Thuringia, Germany.

CALEDONITE. $2(Pb,Cu)O.SO_3.H_2O$. A basic lead and copper sulphate, containing 9.4% copper. Crystallization, orthorhombic. Fracture, uneven. Tenacity, rather brittle. Hardness, 2.5 to 3. Gravity, 6.4. Lustre, resinous. Color, verdigris-green to bluish green. Streak, greenish white. Is translucent. Occurrence, Scotland, Hungary, California, etc.

CANTONITE. A dimorphous variety of covellite, apparently a pseudomorph after galena, crystallized in cubes with cubical cleavage.

CAPILLARY RED OXIDE OF COPPER. Common name for cuprite.

CARMENTITE. A variety of digenite.

CARROLLITE. $CuS.Co_2S_3$. A cobalt and copper sulphide containing 20.5% copper and 38% cobalt. Crystallization, isometric. Fracture, subconchoidal to uneven. Hardness, 5.5. Gravity, 4.85. Lustre, metallic. Color, light steel-gray, with faint reddish hue. Occurrence, Carroll county, Georgia.

CASTILLITE. $(Cu,Ag)_2S.2(Cu,Pb,Zn,Fe)S$. A copper, silver, lead, zinc and iron sulphide carrying circa 41% copper. Apparently an impure bornite. Structure, massive. Hardness, 3. Gravity, 5.19 to 5.24. Resembles bornite in color, streak and tarnish. Occurrence, Guanacevi, Mexico.

CHALCANTHITE. $CuSO_4+5H_2O$. A hydrous copper sulphate containing 25.4% copper. Common names, blue vitriol, bluestone, copper sulphate. Crystallization, triclinic. Structure, massive, stalactitic and reniform, sometimes fibrous. Fracture, conchoidal. Tenacity, brittle. Hardness, 2.5. Gravity, 2.12 to 2.30. Lustre, vitreous. Color, sky-blue. Streak, uncolored. Is translucent to subtransparent. Is soluble in water. Occurs as deposits from mine water in most sulphide copper mines, and is found in impure state, in beds, in Chile.

CHALCOCITE. Cu_2S. A copper sulphide carrying 79.8% copper. Common names, copper glance, cuprous sulphide. Crystallization, orthorhombic; also occurs massive, with structure granular to compact and impalpable. Cleavage, indistinct. Fracture, conchoidal. Tenacity, brittle. Hardness, 2.5 to 3. Gravity, 5.5 to 5.8. Lustre, metallic. Color and streak, blackish lead-gray, tarnishing to dull green or blue. Is soluble in nitric acid. Occurs in all copper districts, frequently in large quantities. Is the richest commercial ore of copper and yields more than one-half of the world's copper supply.

CHALCOLITE. Torbernite.

CHALCOMENITE. $CuO.SeO_2.2H_2O$. A hydrous copper selenite containing 28% copper. Crystallization, monoclinic. Gravity, 3.76. Lustre, vitreous. Color, bright blue. Is transparent. Is soluble in acids. Found at Cacheuta, Mendoza, Argentina.

CHALCOMICHLITE. Bornite.

CHALCOPHACITE. Liroconite.

CHALCOPHYLLITE. $7CuO.As_2O_5.4H_2O$. A hydrous basic copper arsenate containing 42.3% copper. Crystallization, rhombohedral. Hardness, 2. Gravity, 2.43 to 2.66. Lustre, vitreous. Color, grass-green to verdigris-green. Streak, grass-green. Occurs in Hungary, Siberia and Utah.

CHALCOPYRITE. $Cu_2S.Fe_2S_3$. A copper and iron sulphide containing 34.5% copper and 30.5% iron. Is the primary ore of copper. Crystallization, tetragonal, sphenoidal, often twinning, also frequently massive and compact. Fracture, uneven. Hardness, 3.5 to 4. Gravity, 4.1 to 4.3. Lustre, metallic. Color, brass-yellow, often tarnishing to iridescence. Streak, greenish black. Is soluble, except sulphur, in nitric acid, and, on being heated, yields a portion of its sulphur. On exposure to moisture and heat becomes hydrated, and copper and iron change readily to sulphates. Alters to azurite, malachite, melaconite, chalcocite, covellite, bornite, brochantite, chrysocolla, tetrahedrite and tennantite. Is found in practically every copper field in the world, and is second only to chalcocite in importance among the commercial ores of copper.

CHALCOPYRRHOTITE. $CuS.Fe_4S_5$. An iron and copper sulphide containing 13% copper and 48.2% iron. Structure, massive. Hardness, 3.5 to 4. Gravity, 4.28. Color, brassy, with brownish tinge. Occurrence, Nya Kopparberg, Sweden.

CHALCOSIDERITE. $CuO.3Fe_2O_3.2P_2O_5.8H_2O$. A hydrous iron and copper phosphate containing 6.4% copper. Hardness, 4.5. Gravity, 3.1.

lustre, vitreous. Color, light siskin-green. Streak, pale green. Occurs in Cornwall, England and Westphalia, Germany.

CHALCOSINE. Chalcocite.

CHALCOSTIBITE. $Cu_2S.Sb_2S$. A copper sulphoantimonite containing 25.6% copper and 48.5% antimony. Crystallization, orthorhombic. Fracture, subconchoidal. Tenacity, brittle. Hardness, 3 to 4. Gravity, 4.75 to 5. Lustre, metallic. Color, between lead-gray and iron-gray. Occurrence, in the Hartz Mountains of Germany and in Guadix, Spain.

CHALCOTRICHITE. A form of cuprite with capillary or acicular crystallization. Common name, plush copper ore.

CHELEUTITE. A ferruginous, nickeliferous and slightly cupriferous smaltite.

CHENEVIXITE. $2CuO.Fe_2O_3.As_2O_5.3H_2O$. A hydrous copper and iron arsenate containing 21% copper. Structure, massive. Fracture, subconchoidal. Hardness, 3.5 to 4.5. Gravity, 3.93. Lustre, vitreous. Color, dark olive-green to greenish yellow. Streak, yellowish green. Is soluble in acids. Occurrence, Cornwall, England and Eureka, Juab county, Utah.

CHESSY COPPER. Common name for azurite.

CHILEITE. Formula uncertain. A hydrous lead and copper vanadate containing 11.7 to 13.6% copper. Is related to psittacinite. Structure, earthy. Occurrence, Chile.

CHILENITE. $(Ag,Cu)_4Bi$. A silver and copper bismuthide containing 8.5% copper and 75% silver. Structure, amorphous, granular. Is soft. Color, silver-white. Occurrence, Copiapó, Chile.

CHIVIATITE. A lead sulphobismuthite carrying circa 2.5% copper.

CHLOANTHITE. Empirically nickel diarsenide, but analyses invariably show cobalt and iron, and commonly small quantities also of copper, lead, silver, bismuth and antimony.

CHLOROTHIONITE. $CuCl_2.K_2SO_4$. A copper and postassium chlorosulphate. Is an alteration product from Mt. Vesuvius.

CHLOROTILE. Formula probably $3CuO.As_2O_5+6H_2O$. A hydrous copper arsenate containing circa 33% copper. Is related to trichalcite. Crystallization, orthorhombic; also occurs fibrous and massive. Is soft. Color, pale emerald-green. Is transparent.

CHRYSOCOLLA. $CuSiO_3+2H_2O$. A hydrous copper silicate carrying 36% copper. Common names, mountain green and mountain blue. Structure, cryptocrystalline, enamel-like, sometimes botryoidal. Fracture, conchoidal. Is brittle and somewhat sectile. Hardness, 2 to 4. Gravity, 2 to 2.24. Lustre, vitreous to earthy. Color, mountain green, bluish green and sky blue to turquoise-blue, with impure varieties brown to dull black. Streak, white, from pure green and blue varieties. Is opaque to translucent. Is decomposed by acids, without gelatinization. Commonly occurs with carbonate ores in the oxidized zones of copper ore bodies, and is a material ore of value in many districts.

CLAYITE. A lead sulphoantimonite, carrying copper as a replacement of lead to extent of circa 8%.

CLINOCLASITE. $6CuO.As_2O_5.3H_2O$. A hydrous basic

senate carrying 48% copper. Crystallization, monoclinic. Is brittle. Hardness, 2.5 to 3. Gravity, 4.19 to 4.36. Lustre, vitreous to resinous. Color, blackish blue-green externally, dark verdigris-green internally. Streak, bluish green. Is subtransparent to translucent. Is soluble in nitric acid. Occurrence, Cornwall and Utah.

COPPER. Cu. Native copper. The chemical symbol Cu is an abbreviation of cuprum, the Latin word for copper. The metal, native or refined, has the following names in modern languages: kupfer in German; koppar in Swedish; kobber in Norwegian; cobre in Spanish and Portuguese; cuivre in French; rame in Italian.

Atomic weight, 63.2. Belongs in the first group and is the leader of the fifth series of Mendeleéf's Periodic System. The group is as follows: 1, hydrogen; 2, lithium; 3, sodium; 4, potassium; 5, copper; 6, rubidium; 7, silver; 8, cæsium; 9, unknown (possibly terbium, atomic weight 160); 10, gold; 11, unknown. The fifth series, of which copper is the basic leader, is as follows: 1, copper; 2, zinc; 3, gallium; 4, germanium; 5, arsenic; 6, selenium; 7, bromine. The three metallic elements falling between series four and five in Mendeleéf's table, are iron, cobalt and nickel. The frequency with which these three elements are found associated with copper, and the ease with which all four metals replace one another, are notable. The general resemblance between copper, silver and gold, which form ascending steps in the same group, is readily apparent.

System of crystallization, isometric. Tetrahexahedronal forms are the most common, with much twinning. Crystals often show cavernous faces and occasionally elevations, are often distorted and pass gradually through distortions into filiform and arborescent forms. Native copper also occurs massive, in granular form, and in laminae. In the Lake Superior mines the metal occurs in all observed forms and sizes, including lamellae from microscopic flakes up to sheets of immense size and weight, crystals of greatly varying form and size, grains from microscopic size to considerable nodules, and druses, often of considerable size, show various filiform and arborescent shapes. The finest particles are grains and exceedingly minute flakes, occurring in an upper sandstone of the Keweenawan series, while the largest masses, weighing upwards of 500 tons, have been found in contact and fissure veins.

Cleavage, none. Fracture, hackly. Tenacity, second only to that of iron. Is perfectly sectile and highly ductile and malleable, ranking in these particulars with the precious metals. Electrical conductivity, 931, as compared with 1,000 for silver, which possesses the most perfect electrical conductivity of any known metal or alloy. Conductivity for heat, 898, as compared with 1,000 for gold, the most perfect conductor of heat.

Hardness, 2.5 to 3. Specific gravity, in vacuo, at 0 degrees Centigrade (equal to 32°, or freezing point, Fahrenheit), when chemically pure and devoid of porosity, is 8.945. Specific gravity of the ordinary copper of commerce, none of which is free from impurities, varies from about 8.75 when cast, to about 8.95 when rolled, hammered or drawn, the exact gravity depending upon how handled, as well as upon the extent and nature of the impurities contained.

Lustre, metallic. Color, copper-red. Streak, copper-red, metallic, shin-

ig. Tarnishes upon exposure to air to brownish red, and is liable to form coating of verdigris or oxide upon long exposure to air. Atmosphere laden with moisture and carbonic acid is especially favorable to the formation of verdigris.

Fusibility: Copper is fusible at approximately 2,000° Fahrenheit, or a trifle less than 1,100° Centigrade. Color, when fused, sea-green. Copper becomes volatile under the high temperature of the electric arc.

Solubility: Copper is soluble in nitric acid, aqua regia, and strong boiling sulphuric acid, also, slowly, in dilute hydrochloric and sulphuric acids, with admission of air. When in solution in nitric or sulphuric acids will deposit metallic copper on iron immersed therein.

Affinities: Copper has a greater affinity for sulphur than for any other element, possessing also marked affinities for oxygen, carbon dioxide, arsenic, antimony and bismuth, and unites with many other elements.

Alterations: Native copper alters on exposure, especially in damp air, to the simpler oxide and carbonate ores, such as cuprite, malachite and azurite, and occasionally, in time, to the more complex ore forms.

Occurrence: Native copper occurs, usually in small quantities, in most of the principal copper districts of the world. The native metal is mined upon a considerable scale only in Lake Superior, U. S. A., and Bolivia. The Lake Superior native copper carries considerable silver, mechanically admixed, though not alloyed, but carries no gold. In districts outside of Lake Superior and Bolivia the metal occurs most frequently in connection with the oxide and carbonate ores, and occasionally with the secondary sulphide ores.

Impurities: Native copper frequently contains silver, arsenic, bismuth, antimony, zinc and occasionally mercury. Commercial copper, refined from ores, may contain any of the elements already named, and also gold, tin, lead, selenium and tellurium, the latter two elements in very minute quantities.

COPPER GLANCE. Common name for chalcocite.

COPPER MICA. Common name for chalcopyrite.

COPPER NICKEL. Common name for niccolite.

COPPER PHOSPHATE. Common name for libethenite.

COPPER PITCHBLENDE. An impure chrysocolla containing limonite.

COPPER PYRITES. Common name for chalcopyrite.

COPPER SULPHATE. Common name for chalcanthite in nature; blue-stone when manufactured.

COPPER URANITE. Common name for torbernite.

COPPER VITRIOL. Common name for chalcanthite when found native, or for blue-stone when manufactured.

COPPITE. A ferruginous variety of tennantite.

CONDURRITE. Apparently a copper arsenide, related to domeykite. Is supposed to be an alteration product of tennantite. Is soft and black. Occurs in the Condurrow mine, and at Carn Brea, Cornwall, England.

CONICHALCITE. $4(Cu,Ca)O.\ As_2O_5.\ 1\frac{1}{2}H_2O$. A hydrous basic copper and calcium arsenate, carrying 24% copper. Structure, reniform and mas-

sive. Fracture, splintery. Tenacity, brittle. Hardness, 4.5. Gravity, 4.12. Color and streak, pistachio-green. Is subtranslucent. Occurs in Andalusia, Spain and at Eureka, Juab county, Utah.

CONNELLITE. Formula probably $Cu_{18}(Cl,OH)_{32}SO_{16}.15H_2O$. A hydrous basic copper chlorosulphate, containing circa 57.6% copper. Crystallization, hexagonal. Hardness, 3. Gravity, 3.36. Lustre, vitreous. Color, fine blue. Is translucent. Is soluble in nitric acid. Occurrence, Cornwall, England.

CORNWALLITE. $5CuO.As_2O_5.3H_2O$. A hydrous basic copper arsenate containing 46.5% copper. Structure, massive. Fracture, conchoidal. Hardness, 4.5. Gravity, 4.16. Color, verdigris-green to emerald green. Occurrence, Cornwall, England.

COSALITE. Empirically lead sulphobismuthite, but usually cupriferous to the extent of from a trace to 8.75% copper.

COVELLINE. Covellite.

COVELLITE. CuS. A copper sulphide containing 66.4% copper. Chemical name, cupric sulphide. Crystallization, hexagonal; also occurs massive. Is flexible in thin layers, with basal cleavage. Hardness, 1.5 to 2. Gravity, 4.6. Lustre, submetallic on crystals, dull when massive. Color, dark indigo-blue. Streak, lead-gray to black, shining. Occurs in most sulphide copper districts, as a secondary ore and is a valuable commercial ore of copper, when found in sufficient quantities, as in Utah, Wyoming and elsewhere.

CLARITE. A dimorphous form of enargite, from Schapbach, Baden, Germany.

CREDNERITE. $3CuO.2Mn_2O_3$. A copper manganate containing 34.4% copper. Crystallization, monoclinic. Cleavage, basal, perfect, less distinct in other directions. Hardness, 4.5. Gravity, 4.9 to 5.1. Lustre, metallic. Color, iron-black to steel-gray. Streak, brownish black. Is soluble in hydrochloric acid.

CROOKESITE. $(Cu,Tl,Ag)_2Se$. A copper, thallium and silver selenide, containing 44 to 46% copper, 17 to 18.5% thallium and 1.5 to 5% silver. Structure is massive, without crystallization. Is brittle. Hardness, 2.5 to 3. Gravity, 6.9. Lustre, metallic. Color, lead-gray. Occurrence, Småland, Sweden.

CUBANITE. $CuS.Fe_2S_3$. An iron and copper sulphide containing 23.3% copper and 41.3% iron. Crystallization, isometric; also occurs massive. Cleavage, cubic. Hardness, 4. Gravity, 4.026 to 4.169. Color, bronze to brass-yellow. Streak, dark reddish bronze to black. Occurrence, Cuba and Sweden.

CUMENGITE. $PbCl_2.CuO.H_2O$. A hydrous lead and copper oxychloride, related to boléite. Crystallization, tetragonal.

CUPRIC OXIDE. Tenorite, when found in nature; copper monoxide in chemistry.

CUPRITE. Cu_2O. A copper oxide, containing 88.8% copper, being the richest copper ore. Chemical names, cuprous oxide, copper protoxide. Common names, ruby copper, red glassy copper ore, octrahedral copper ore. Crystallization, isometric, commonly in octohedrons; also occurs massive,

ranular and sometimes earthy. Fracture, conchoidal. Is brittle. Hardness, 3.5 to 4. Gravity, 5.85 to 6.15. Lustre, adamantine to earthy. Color, ght to dark red; when fresh, usually ruby-red, but fades to duller red. treak, brownish red, shining. Is subtransparent to subtranslucent. Occurs most copper districts in the upper oxidized zone, frequently shading nto crystals of native copper.

CUPROBISMUTITE. $3Cu_2S.\ 4Bi_2S_3$. A copper sulphobismuthite containing 15% copper and 65.1% bismuth. Occurs in prismatic crystals. Gravity, 6.31 to 6.68. Lustre, metallic. Color, dark bluish black. Streak, black. The copper frequently is replaced partially by silver.

CUPROCALCITE. Formula perhaps $(Cu_2O)_2.\ CO_2+2CaO.\ CO_2+H_2O$. Apparently merely an intimate mixture of cuprite and calcium carbonate. Hardness, 3. Gravity, 3.9. Color, vermilion-red. Is soluble in hydrochloric acid.

CUPROCASSITERITE. Formula possibly $4SnO_2+Cu_2Sn(OH)_4$. Occurrence, Black Hills of South Dakota.

CUPRODESCLOIZITE. A cupriferous variety of descloizite, which is a basic lead and zinc vanadate.

CUPROFERRITE. Pisanite.

CUPROIODARGYRITE. CuI.AgI. A copper and silver iodide. Apparently a decomposition product of stromeyerite. Occurs, as incrustations, at Huantajaya, Chile.

CUPROMAGNESITE. $(Cu, Mg)\ SO_4+7H_2O$. A copper and magnesium sulphate. Color, bluish green. Is an alteration product, occurring as incrustations, from Mt. Vesuvius.

CUPROPLUMBITE. $5Cu_2S.\ PbS$. A copper and lead sulphide, carrying 61.3% copper and 19% lead. Structure, massive. Lustre, feeble or lacking. Color, lead-gray to indigo-blue. Occurence, Catemou, Aconcagua, Chile, Butte, Montana, and Semipalatinsk, Siberia.

CUPROPYRITE. $CuFe_2S_4$. An iron and copper sulphide, carrying 24% copper. Is closely related to cubanite.

CUPROSCHEELITE. $(Ca,Cu)WO_4$. A calcium and copper tungstate carrying 3 to 5% copper. Is a variety of cuprotungstite in which copper is mainly replaced by calcium.

CUPROTUNGSTITE. $CuWO_4$. A copper tungstate carrying 24% copper. Structure, granular and incrustive. Hardness, 4.5 to 5. Color, pistachio-green to leek-green. Streak, greenish gray to greenish yellow. Is soluble in hydrochloric acid. Occurrence, Llamuco, Santiago de Chile.

CUPROURANITE. Torbernite.

CUPROUS OXIDE. Cuprite in nature. Chemical term for two atoms of copper united with one atom of oxygen.

CUPROVANADITE. Chileite.

CYANOCHALCITE. A phosphoriferous variety of chrysocolla, from Nijni Tagilsk, Perm, Russia.

CYANOCHROITE. $CuSO_4.K_2SO_4+6H_2O$. A hydrous copper and potassium sulphate, carrying 14.3% copper. Crystallization, monoclinic. Color, clear blue. Is an alteration product from Mt. Vesuvius.

CYANOTRICHITE. $4CuO.Al_2O_3.SO_3.8H_2O$. A hydrous basic copper and aluminum sulphate, carrying 39.4% copper. Crystallization, orthorhombic. Lustre, pearly. Color, smalt-blue to sky-blue. Occurrence, Hungary, France, Arizona and Utah.

DARWINITE. Whitneyite.

DELAFOSSITE. An iron, copper and aluminum oxide containing 37.9% copper, 47.99% iron sesquioxide and 3.52% aluminum sesquioxide. Occurrence, Ekaterinburg, Perm, Russia.

DEMIDOVITE. A phosphoriferous variety of chrysocolla from Tagilsk, Perm, Russia.

DIGENITE. Apparently a partly altered chalcocite containing a considerable percentage of covellite.

DIHYRITE. $5CuO.P_2O_5.2H_2O$. A hydrous basic copper phosphate containing 55.2% copper. Crystallization, monoclinic; also occurs massive and fibrous. Fracture, conchoidal to uneven. Tenacity, brittle. Hardness, 4.5 to 5. Gravity, 4 to 4.4. Lustre, adamantine. Color, dark emerald-green. Streak, pale emerald-green. Is translucent. Is soluble in nitric acid. Occurrence, Germany and the Ural Mountains of Russia.

DILLENBURGITE. An impure chrysocolla containing copper carbonate.

DIOPTASE. $CuO.SiO_2.H_2O$. A hydrous copper silicate carrying 40.3% copper. Common names, emerald copper, emerald malachite. Crystallization, rhombohedral; also occurs massive. Fracture, conchoidal to uneven. Tenacity, brittle. Hardness, 5. Gravity, 3.28 to 3.35. Lustre, vitreous, Color, emerald-green. Streak, green. Is subtranslucent to transparent. Gelatinizes with hydrochloric acid. Is fusible with charcoal and soda. Occurrence, Chile, Hungary, Siberia, French Congo, Arizona, etc.

DOGNACSKAITE. Formula perhaps $3Cu_2S.5Bi_2S_3$. A variety of cuprobismutite carrying slightly less copper and sulphur and slightly more bismuth than the normal mineral.

DOLEROPHANITE. $2CuO.SO_3$. A basic copper sulphate carrying 53.1% copper. Crystallization, monoclinic. Color, brown. Is soluble in nitric acid. Is a sublimation product from Mt. Vesuvius.

DOMEYKITE. Cu_3As. A copper arsenide carrying 71.7% copper. Common name, arsenical copper. Structure, reniform and botryoidal, also massive and disseminated. Fracture, uneven. Hardness, 3 to 3.5. Gravity, 7.2 to 7.75. Lustre, metallic, dulling on exposure. Color, tin-white to steel gray, tarnishing to iridescence. Is fusible in open tube, yielding a white sublimate of arsenic trioxide. Is soluble in nitric acid. Occurrence, Chile, Bolivia, Saxony, Mexico and Lake Superior.

DUCKTOWNITE. Apparently merely a mechanical mixture of chalcocite and pyrite.

DÜRFELDTITE. $3(Pb,Ag,Cu,Mn,Fe)S.Sb_2S_3$. A lead, silver, copper, manganese and iron sulphobismuthite. Occures in acicular crystals. Hardness, 2.5. Gravity, 5.4. Lustre, metallic. Color light gray. Is related to stylotypite. Found in Perú.

EHLITE. $5CuO.P_2O_5.3H_2O$. A hydrous basic copper phosphate con-

taining 52 to 55% copper. Is closely related to dihydrite and pseudomalachite. Gravity, 4.2 to 4.4. Occurrence, Cornwall, England and Nijni Tagilsk, Perm, Russia.

EMERALD COPPER. Common name for dioptase.

EMERALD MALACHITE. Common name for dioptase.

EMPLECTITE. $Cu_2S.Bi_2S_3$. A copper sulphobismuthite containing 19.5% copper and 62% bismuth. Crystallization, orthorhombic. Tenacity, brittle. Hardness, 2. Gravity, 6.3 to 6.5. Lustre, metallic. Color, tin-white. Occurrence, Chile, Saxony and Norway.

ENARGITE. $3Cu_2.As_2S_5$. A copper sulphoarsenite containing 48.3% copper. Crystallization, orthorhombic; also occurs massive and granular. Fracture, uneven. Tenacity, brittle. Hardness, 3. Gravity, 4.45. Lustre, metallic. Color and streak, grayish black to iron-black. Is soluble in aqua regia and fusible on charcoal. Occurs in many copper fields, notably at Butte, Montana, where it is a common and valuable ore.

EPIGENITE. Formula probably $4Cu_2S.3FeS.As_2S_5$. A copper and iron sulphoarsenite, carrying circa 41% copper. Crystallization, orthorhombic. Fracture, uneven. Hardness, 3.5. Lustre, metallic. Color, steel-gray. Streak, black. Is soluble in nitric acid. Occurrence, Wittichen, Baden, Germany.

ERINITE. $5CuO.As_2O_5.2H_2O$. A hydrous basic copper arsenate, containing 47.8% copper. Occurs in mamillated concentric crystalline groups, also fibrous and rough. Tenacity, brittle. Hardness, 4.5 to 5. Gravity, 4.04. Lustre, slightly resinous. Color, emerald-green. Streak, grass-green. Is opaque to subtranslucent. Is soluble in nitric acid. Occurrence, Cornwall and Utah.

ERYTHROCALCITE. $CuCl_2+nH_2O$. A hydrated copper chloride. Is an alteration product from Mt. Vesuvius.

EUCAIRITE. $Cu_2Se.Ag_2Se$. A silver and copper selenide carrying 15.3% copper and 43.1% silver. Crystallization, isometric; also occurs massive and granular. Hardness, 2.5. Gravity, 7.5. Lustre, metallic. Color, silver-white to lead-gray. Streak, shining. Occurrence, Småland, Sweden, and Copiapó, Chile.

EUCHLORINE. A compound of copper sulphate and cuprous chloride, from Mt. Vesuvius.

EUCHROITE. $4CuO.As_2O_5.7H_2O$. A hydrous basic copper arsenate containing 39.7% copper. Crystallization, orthorhombic. Fracture, subconchoidal. Tenacity, brittle. Hardness, 3.5 to 4. Gravity, 3.39. Lustre, vitreous. Color, emerald-green to leek-green. Is translucent to transparent. Occurrence, Libethen, Hungary.

FAHLORE. Common name for tetrahedrite or tennantite.

FALKENHAYNITE. $3Cu_2S.Sb_2S_3$. A copper sulphoantimonite carrying 39.5% copper. Apparently is related to stylotypite. Structure, massive. Gravity, 4.83. Color, gray-black. Occurrence, Joachimsthal, Bohemia, Austria.

FAMATINITE. $3Cu_2S.Sb_2S_5$. A copper sulphoantimonite carrying 43.3% copper. Crystallization, orthorhombic; is isomorphous with enargite;

also occurs massive. Fracture, uneven. Tenacity, brittle. Hardness, 3.5. Gravity, 4.57. Color, gray with copper-red tinge. Streak, black. Is fusible on charcoal. Decrepitates in closed tube. Occurrence, Sierra de Famatina, Rioja, Argentina and Cerro de Pasco, Junín, Perú.

FIELDITE. A zinciferous variety of tetrahedrite.

FOOTEITE. $8Cu(OH)_2$. $CuCl_2+4H_2O$. A hydrous basic copper oxychloride containing 55.3% copper. Is closely related to tallingite. Crystallization, monoclinic. Color, deep blue. Occurrence, Bisbee, Arizona.

FOURNETITE. Apparently merely a mechanical mixture of tetrahedrite and galena.

FREDRICITE. An argentiferous, plumbiferous and stanniferous variety of tennantite, from Sweden.

FREIBERGITE. An argentiferous tetrahedrite carrying variable percentages of silver as a replacement of the copper found in the normal tetrahedrite.

FRIGIDITE. A ferruginous and nickleiferous variety of tennantite.

GERHARDITE. $4CuO.\ N_2O_5.\ 3H_2O$. A basic copper nitrate containing 52.9% copper. Crystallization, orthorhombic. Cleavage, yields flexible laminae. Tenacity, fragile and sectile. Hardness, 2. Gravity, 3.426. Lustre, vitreous, brilliant. Color, deep emerald-green. Streak, light green. Is transparent. Is soluble in dilute acids. Occurrence, Jerome, Arizona.

GERSDORFFITE. Empirically nickel sulphoarsenite, but occasionally slightly cupriferous.

GLANCE. Common name for sulphide ores with dark metallic lustre. Copper glance is chalcocite.

GLASBACHITE. Zorgite.

GLAUCOPYRITE. An iron and cobalt diarsenide, occasionally slightly cupriferous.

GRAY COPPER. Common name for tetrahedrite; name also is applied to tennantite, which shades into tetrahedrite.

GREEN COPPER. Common name for malachite.

GRÜNAUITE. An impure nickel sulphide (polydimite) carrying copper, lead, cobalt, iron and bismuth, copper ranging 1.68 to 11.56% in tenor in published assays.

GUEJARITE. $Cu_2S.\ 2Sb_2S_3$. A copper sulphoantimonite containing 15.2% copper. Crystallization, orthorhombic. Tenacity, brittle. Hardness, 3.5. Gravity, 5.03. Lustre, metallic. Color, steel-gray, with bluish tinge. Streak, black. Occurrence, Andalusia, Spain.

HARRISITE. A pseudomorph of chalcocite after galena.

HENWOODITE. Chemical formula uncertain. A hydrous aluminum and copper phosphate carrying circa 5.6% copper. Occurs in botryoidal globular masses. Fracture, conchoidal. Hardness, 4.4 to 4.5. Gravity, 2.67. Color, turquoise-blue. Streak, bluish to greenish white. Occurs in Cornwall, England.

HERMESITE. An imperfectly established variety of schwatzite.

HERRENGRUNDITE. $CaO.\ 4CuO.\ 2SO_3.\ 6H_2O$. A hydrous basic cop-

per and calcium sulphate carrying 39.5% copper. Is related to brochantite. Crystallization, monoclinic. Tenacity, rather brittle. Hardness, 2.5. Gravity, 3.13. Lustre, vitreous. Color, emerald-green to bluish-green. Streak, light green. Is transparent. Occurrence, Herrengrund, Hungary.

HOMICHLINITE. Chemical formula uncertain. A copper and iron sulphide carrying circa 43.8% copper. Apparently is chalcopyrite partly altered to bornite, and close to barnhardtite. Crystallization, tetragonal; also occurs massive. Hardness, 4 to 5. Gravity, 4.48. Color, brassy bronze. Streak, black. Occurrence, Chile, Germany, Japan, etc.

HORSEFLESH ORE. Common name for bornite.

HORSFORDITE. Cu_5Sb. A copper-antimonide carrying 76% copper. Structure, massive. Is brittle. Hardness, 4 to 5. Gravity, 8.8. Lustre, metallic. Color, silver-white, tarnishing easily. Is said to occur in large deposits on the Island of Mitylene, Asia Minor.

HYDROCIANITE. $CuO.SO_3$. A copper sulphate carrying 39.6% copper. Crystallization, orthorhombic. Is soluble in water. Is an alteration product from Mt. Vesuvius.

HYDROCUPRITE. Apparently a hydrated cuprite. Is amorphous, occurring in very thin coatings on magnetite. Color, orange-red to orange-yellow. Found at Schapbach, Baden, Germany, and at Cornwall, Pennsylvania.

INDIGO COPPER. Common name for covellite.

ISOPYRE. Apparently an impure opal, carrying about 1.6% copper, found at St. Just, Cornwall, England.

JALPAITE. $3Ag_2S.Cu_2S$. A silver and copper sulphide, carrying 13.1% copper and 71.5% silver. Apparently is a cupriferous argentite. Crystallization, isometric. Tenacity, malleable. Gravity, 6.89. Color, blackish lead-gray. Occurrence, Jalpa, Mexico.

JAMESONITE. A lead sulphoantimonite, sometimes cupriferous to the extent of about 3.5%.

JOHANNITE. Chemical formula uncertain. A hydrous uranium and copper sulphate, containing circa 4.8% copper. Crystallization, monoclinic. Hardness, 2 to 2.5. Gravity, 3.19. Lustre, vitreous. Color, emerald-green to apple-green. Streak, paler green. Is translucent to transparent. Taste, bitter. From Joachimsthal, Bohemia.

JULIANITE. A slightly argentiferous and ferruginous variety of tennantite, from Silesia, Germany.

KAMAREZITE. $(CuOH)_2SO_4.Cu(OH)_2+6H_2O$. A hydrated copper-sulphate. Crystallization, probably orthorhombic. Occurrence, Laurium, Greece.

KARAMSINITE. Chemical formula uncertain. As determined is a weird silicate of aluminum, iron, manganese, copper, calcium, magnesium and potassium, containing circa 1.85% copper. Occurrence, Finland.

KEWEENAWITE. $(Cu,Ni)_2As$. A copper and nickel arsenide, related to mohawkite, carrying 39 to 54% copper and 9.7% to 20% nickel, with cobalt replacing nickel to extent of about 0.9%. Structure, massive. Cleavage, subconchoidal. Fracture, uneven. Tenacity, slight. Hardness, 4. Gravity, 7.7. Lustre, metallic. Color, pale red, tarnishing to

darker red. Is soluble in nitric acid. Occurrence, Mohawk mine, Keweenaw county, Michigan.

KLAPROTHOLITE. $3Cu_2S.\ 2Bi_2S_3$. A copper sulphobismuthite containing 25.3% copper and 55.4% bismuth. Crystallization, orthorhombic. Fracture, uneven. Tenacity, brittle. Hardness, 2.5. Gravity, 4.6. Lustre, metallic. Color, steel-gray, tarnishing to iridescent brass-yellow. Occurrence, Baden, Germany.

KOBELLITE. A lead sulphoantimonite, usually cupriferous to the extent of about 1%.

KRÖHNKITE. $CuSo_4.Na_2SO_4+2H_2O$. A hydrous copper and sodium sulphate carrying 18.8% copper. Crystallization, monoclinic. Fracture, conchoidal. Hardness, 2.5. Gravity, 1.98. Lustre, vitreous. Color, azure-blue. Occurrence, Cobija, Atacama, Chile.

LAMPADITE. A cupriferous wad containing .3 to 15% copper.

LANGITE. $4CuO.SO_3.4H_2O$. A hydrous basic copper sulphate containing 53% copper. Is closely related to brochantite. Crystallization, orthorhombic. Hardness, 2.5 to 3. Gravity, 3.5. Lustre, vitreous on crystals, silky on crusts. Color, greenish blue. Is translucent. Occurrence, Cornwall, England.

LAUTITE. An imperfectly determined copper sulphoarsenite, of the enargite family, from Marienberg, Saxony.

LAVENDULAN. Chemical formula probably $3(Cu,Co,Ni)O.\ As_2O_5+3H_2O$. A hydrous copper, cobalt and nickel arsenate, containing about 32% copper, 2.5% cobalt monoxide and 1.35% nickel monoxide. Is related to trichalcite. Structure, amorphous. Fracture, conchoidal. Hardness, 2.5 to 3. Gravity, 3.01. Lustre, greasy to vitreous. Color, lavender blue. Streak, pale lavender blue. Diaphaneity, translucent. Is soluble in warm hydrochloric acid. Occurrence, Chile and Saxony.

LAXMANNITE. Vauquelinite.

LEPIDOPHAEITE. A varietal form of lampadite.

LETTSOMITE. Cyanotrichite.

LEUCOCHALCITE. $4CuO.As_2O_5.\ 3H_2O$. A hydrous basic copper arsenate, carrying about 39.8% copper. Structure, acicular. Lustre, silky. Color, light greenish white.

LIBETHENITE. $4CuO.P_2O_5.H_2O$. A hydrous copper phosphate carrying 51.1% copper. Common name, copper phosphate. Crystallization, orthorhombic. Fracture, subconchoidal to uneven. Tenacity, brittle. Hardness, 4. Gravity, 3.6 to 3.8. Lustre, resinous. Color and streak, olive-green. Diaphaneity, subtranslucent. Is soluble in nitric acid. Occurrence, Chile, Bolivia, England, Germany and Hungary.

LILIANITE. A lead sulphobismuthite, sometimes cupriferous to the extent of about 1.5%.

LIME-MALACHITE. Apparently merely a malachite carrying gypsum or calcite, or both, as impurities.

LINARITE. $PbO.CuO.SO_3.H_2O$. A basic lead and copper sulphate carrying 15.8% copper and 55.7% lead oxide. Crystallization, monoclinic. Fracture, conchoidal. Tenacity, brittle. Hardness, 2.5. Gravity, 5.3 to

5.45. Lustre, vitreous to adamantine. Color, deep azure-blue. Streak, pale blue. Diaphaneity, translucent. Occurs in many lead and copper districts.

LINDACKERITE. Chemical formula probably $3NiO.\ 6CuO.\ SO_3.\ 2As_2O_5.\ 7H_2O$. A hydrous copper and nickel sulphoarsenate containing 27.8% copper. Crystallization, orthorhombic. Hardness, 2 to 2.5. Gravity, 2 to 2.5. Lustre, vitreous. Color, verdigris-green to apple-green. Streak, pale green to white.

LINNAEITE. A cobalt sulphide in which cobalt frequently is replaced partially by nickel, iron or copper, latter to the extent of 1 to 8%.

LIROCONITE. $18CuO.\ 4Al_2O_3.\ 5As_2O_5.\ 55H_2O$. A hydrous basic copper and aluminum arsenate carrying 28.7% copper. Crystallization, monoclinic; also occurs rarely, granular. Cleavage, subconchoidal. Is imperfectly sectile. Hardness, 2 to 2.5. Gravity, 2.88 to 2.98. Lustre, vitreous. Color and streak, sky-blue to verdigris-green. Is soluble in nitric acid. Occurrence, Hungary and Cornwall, England.

LITHIDIONITE. A copper, iron, potassium and sodium silicate carrying circa 5.2% copper. Is an alteration product from Mt. Vesuvius.

LUNNITE. A name proposed for dihydrite, pseudomalachite and their varietal forms.

LUZONITE. A dimorphous form of enargite, found in the Mancayan-Suyoc district, Lepanto, Luzon, Philippines.

LYELLITE. Langite.

MALACHITE. $2CuO.\ CO_2.\ H_2O$. A basic copper carbonate carrying 57.5% copper. Common names, green copper carbonate, basic cupric carbonate. Crystallization, monoclinic. Commonly massive, but frequently incrustive and sometimes granular or earthy, and disseminated as stains. Fracture, subconchoidal to uneven. Tenacity, brittle. Hardness, 3.5 to 4. Gravity, 3.9 to 4.03. Lustre, of crystals, adamantine, frequently with concretionary bands of varying shades from pistachio-green to bluish green. Streak, green. Is opaque to translucent. Is soluble in nitric acid. Occurs in most copper districts, in the upper portions of the oxidized zones of ore bodies, and frequently is an important commercial ore. When massive and beautifully marked is a semi-precious stone, used for table tops, etc.

MALINOWSKITE. A plumbiferous and usually argentiferous variety of tennantite.

MARCYLITE. An imperfectly determined alteration product from copper sulphides, consisting of hydrated copper oxides and sulphides. Occurrence, Peru and Arkansas, U. S. A.

MARSHITE. Cu_2I_2. A copper iodide containing 33.4% copper. Crystallization, tetragonal. Fracture, subconchoidal. Tenacity, brittle. Lustre, adamantine. Color, oil-brown. Streak, orange-yellow. Is translucent. Occurrence, Broken Hill mines, New South Wales, Australia.

MELACONITE. Tenorite.

MELANOCHALCITE. $Cu_2(Si,C)O_4.Cu(OH)_2$. A copper silicate containing 61.4% copper. Structure, amorphous or cryptocrystalline, habit of crystals being undetermined. Hardness, 4. Gravity, 4.14. Lustre, vitreous. Color, jet black, powder is coffee-brown. Fine particles are translucent under high power of microscope, light passing through as yellowish brown.

Is decomposed by dilute hydrochloric acid, even a 3% solution changing a fragment into a white silicious mass retaining the original outlines, only cupric chloride being produced. Heated in a closed tube loses water and carbon dioxide, and powder changes in color from coffee-brown to brownish black. Heated with borax gives the sky-blue color of copper. With salt of phosphorous gives a skeleton of silica on the blue glass. SiO_2 and CO_2 replace each other within certain limits. From this fact, and the behavior of the mineral under dilute hydrochloric acid, it is deduced by Dr. Geo. A. Koenig, the discoverer, that there exists in it a compound orthoacid, $H_4(Si,C)O_4$, with the hydrogen replaced by copper. Viewed in this light melanochalcite represents the basic copper salt of the orthoacid. Occurs in the Calumet & Arizona mine, Bisbee, Arizona, the mineral surrounding cuprite as a black band, and being overlaid, in turn, by chrysocolla and malachite.

MELANOTHALLITE. Chemical formula probably $CuCl_2.CuO.2H_2O$. A copper oxychloride. Is an alteration product of Mt. Vesuvius.

MIARGYRITE. A silver sulphoantimonite, frequently cupriferous to the extent of one-half to one per cent.

MIXITE. Chemical formula probably $20CuO.\ Bi_2O_3.\ 5As_2O_5.\ 22H_2O$. A hydrated basic copper arsenobismuthite, carrying 35.2% copper. Occurs in acicular crystals. Hardness, 3 to 4. Gravity, 3.79. Color, whitish green to emerald-green or bluish green. Streak, lighter green. Is translucent, and, in fine particles, transparent. Occurrence, Baden, Germany, and Utah.

MOKAWKITE. $(Cu, Ni, Co)_2As$. A copper, nickel and cobalt arsenide, carrying 63 to 69% copper, 3 to 7% nickel and 0.5 to 2% cobalt, usually somewhat argentiferous. Crystallization, hexagonal, by synthesis, no crystals being found in nature. Cleavage, indistinct. Fracture, uneven. Tenacity, slight. Hardness, 4. Gravity, 8.05. Color, light gray on fresh fractures, tarnishing to purple or brassy yellow. Streak, gray. Is soluble in nitric acid. Occurrence, Mohawk mine, Keweenaw county, Michigan.

MOHAWK-WHITNEYITE. Cu_3As. A copper arsenide, carrying 83 to 87% copper. Is a mere name of convenience for an intimate blending of mohawkite and whitneyite, or keweenawite and whitneyite, indistinguishable to the eye but determined chemically. Cleavage, none. Fracture, hackly. Tenacity, is malleable, to only a slightly less extent than copper. Hardness, about 5. Gravity, 8.6. Color, gray, with a yellowish tinge, tarnishing to coffee-brown. Streak, gray. Is soluble in nitric acid, with a small residue of gray powder. Occurrence, at Mohawk mine, Keweenaw county, Michigan.

MOTTRAMITE. Chemical formula undetermined. A hydrous basic lead and copper vanadate containing about 16.3% copper. Is very closely related to psittacinite.

MOUNTAIN BLUE. Common name for azurite.

MOUNTAIN GREEN. Common name for malachite. Name sometimes is applied to chrysocolla also.

MYSORIN. An impure malachite from Mysore, India.

NAMAQUALITE. Chemical formula probably $2CuO.Al_2O_3.4H_2O$. A hydrated copper and aluminum oxide, carrying 35.8% copper. Occurrence, Little Namaqualand, Cape Colony.

NANTOKITE. Cu_2Cl_2. A copper chloride, carrying 84.1% copper. Crystallization, isometric; also occurs massive and granular. Cleavage, cubic. Fracture, conchoidal. Hardness, 2 to 2.5. Gravity, 3.9. Lustre, adamantine. Color, grayish white to colorless. Is translucent to transparent. Is soluble in nitric or hydrochloric acids, and in ammonia. Yields chlorine when sharply struck. Oxidizes readily on exposure to atmosphere. Occurrence, Carmen Bajo mine, Chile, and Broken Hill mines, New South Wales.

OCTAHEDRAL COPPER ORE. Common name for cuprite.

OLIVE GREEN COPPER ORE. Common name for olivenite.

OLIVENITE. $4CuO.As_2O_5.H_2O$. A hydrous basic copper arsenate, carrying 44.8% copper. Common name, olive green copper ore. Crystallization, orthorhombic, with prismatic and acicular crystals; also occurs globular and granular. Fracture, conchoidal to uneven. Tenacity, brittle. Hardness, 3. Gravity, 4.1 to 4.4. Lustre, adamantine to vitreous. Color, olive-green to blackish green. Is opaque to subtransparent. Is soluble in nitric acid. Occurrence, Nijni Tagilsk, Perm, Russia, Cornwall and Devon, England, Chile, Utah, etc.

ORILEYITE. $(Cu_2,Fe)_2(As,Sb)_2$. A copper and iron arsenoantimonite, carrying 12.13% copper. Is related to stibiodomeykite. Structure, massive. Hardness, 5.5. Gravity, 7.4. Lustre, metallic. Color, steel-gray, with purplish tinge on fresh fracture. Streak, dark gray. Occurrence, Burmah.

PARAMELACONITE. CuO. A copper oxide carrying 79.3% copper. Is a dimorphous form of melaconite. Crystallization, tetragonal. Hardness, 5. Gravity, 5.83. Lustre, brilliant. Color, purplish black on faces, pitch-black on fractures. Occurrence, with footeite, at Bisbee, Arizona.

PARTZITE. Chemical formula undetermined. A hydrous copper antimonite, carrying circa 28.7% copper. Fracture, conchoidal. Hardness, 3 to 4. Gravity, 3.8. Color, yellowish green to blackish green. Occurrence, Mono county, California.

PEACOCK ORE. Common name for bornite. Sometimes is applied also to chalcopyrite when showing an iridescent tarnish.

PEARCEITE. Chemical formula probably $9(Ag,Cu)_2S.As_2S_3$. A silver and copper sulphoantimonite. Crystallization, rhombohedral; also occurs massive. Cleavage, none. Fracture, conchoidal. Tenacity, brittle. Hardness, 3. Gravity, 6.125. Lustre, metallic. Color and streak, black. Occurrence, Aspen, Colorado.

PELOCONITE. A varietal form of lampadite.

PENTLANDITE. An iron and nickel sulphide carrying up to 1.75% copper.

PERCYLITE. Chemical formula probably $PbCuO.Cl_2.H_2O$. A hydrous lead and copper oxychloride carrying circa 17% copper. Crystallization, isometric. Hardness, 2.5. Color and streak, sky-blue. Occurrence, Bolivia, South Africa and Mexico.

PHILLIPITE. $CuSO_4.Fe_2(SO_4)_3+nH_2O$. A hydrous copper and iron sulphate, carrying 11.5% copper. Structure, granular and fibrous. Lustre, vitreous. Color, azure-blue. Diaphaneity, translucent. Taste, astringent. Is soluble in water. Occurrence, Los Condes, Santiago de Chile.

PHOSPHOROCHALCITE. $6CuO.\ P_2O_5.\ 3H_2O$. A hydrous basic copper phosphate, closely related to dihydrite and pseudomalachite.

PHOSPHOCHROMITE. Vauquelinite.

PILARITE. An aluminous variety of chrysocolla, from Chile.

PISANITE. $(Fe,Cu)SO_4+7H_2O$. A hydrous iron and copper sulphate, carrying variable percentages of copper. Practically is a cupriferous melanterite, or copperas. Crystallization, monoclinic. Lustre, vitreous. Color, bright blue. Occurrence, Italy and Turkey.

PLANERITE. A hydrous aluminum, copper and iron phosphate, carrying circa 2.8% copper. Occurrence, Gumishevsk, Perm, Russia.

PLUMBOCUPRITE. Cuproplumbite.

PLUSH COPPER ORE. Common name for cuprite.

POLYBASITE. $9(Ag,Cu)S.Sb_2S_3$. A silver and copper sulphoantimonite carrying 3 to 10% copper and 62 to 72% silver. Crystallization, orthorhombic. Fracture, uneven. Hardness, 2 to 3. Gravity, 6 to 6.2. Lustre, metallic. Color, iron-black, in thin splinters cherry-red. Streak, black. Is nearly opaque. Occurrence, Guanajuato, Mexico, Colorado, etc.

PRASINE. A varietal form of dihydrite, containing alumina, silica and arsenic in small amounts, apparently merely as impurities.

PSEUDOBOLÉITE. Cumengite.

PSEUDOLIBETHENITE. Libethenite.

PSEUDOMALACHITE. $6CuO.P_2O_5.3H_2O$. A hydrous basic copper phosphate containing 53.5% copper. Is closely related to dihydrite, but has one extra unit each of cupric oxide and water. Structure, massive, reniform and botryoidal. Hardness, 4.5 to 5. Gravity, 3.4 to 4.4. Lustre, vitreous. Color, emerald-green to blackish green. Streak, paler green.

PSITTACINITE. Chemical formula probably $4(Pb, Cu).\ V_2O_5.\ 2H_2O$. A hydrous basic lead and copper vanadate, containing circa 15.4% copper. Structure, pulverulent. Color, olive-green. Occurrence, Argentina and Montana.

PURPLE COPPER ORE. Common name for bornite.

PYRITES OF COPPER. Common name for chalcopyrite.

RABDIONITE. Chemical formula uncertain. A hydrated iron, manganese and copper oxide, containing 11.2% copper. Is very soft. Gravity, 2.8. Lustre, dull. Color, black. Streak, dark brown. Occurrence, Nijni Tagilsk, Perm, Russia.

RAHTITE. An impure cupriferous sphalerite.

RAMIRITE. Cuprodescloizite.

RED COPPER ORE. Common name for cuprite.

RED GLASSY COPPER ORE. Common name for cuprite.

REDRUTHITE. Chalcocite.

REGNOLITE. $5CuS.\ FeS.\ ZnS.\ As_2S_3$. A copper, iron and zinc sulphoarsenite containing 32.6% copper. Is closely related to sandbergerite. Crystallization, tetragonal. Occurrence, Cajamarca, Perû.

RESANITE. Chemical formula uncertain. A hydrous copper and iron silicate, containing circa 18.5% copper. Structure, massive. Color, olive-

green. Is soluble in hydrochloric acid. Occurence, Luquillo, Porto Rico, associated with chrysocolla and malachite.

REZBANYITE. A lead sulphobismuthite, usually cupriferous to the extent of 1.75 to 3.75%.

RICHMONDITE. A cupriferous variety of beegerite, which is, normally, a lead sulphobismuthite.

RICKARDITE. $Cu_2Te.2CuTe$. A copper telluride containing 40.5% copper. Structure, massive. Fracture, irregular. Hardness, 3.5. Gravity, 7.54. Color, brilliant purple, rivaling bornite tarnish, even on a fresh fracture, and showing deep color when pulverized. Is fusible on charcoal and soluble in nitric acid. Occurrence, Good Hope mine, Vulcan, Colorado.

RIONITE. A bismuthiferous variety of tennantite.

RIVOTITE. Chemical formula uncertain. A copper and antimony carbonate carrying circa 31.6% copper. Structure, amorphous, compact. Fracture, uneven. Tenacity, fragile. Hardness, 3.5 to 4. Gravity, 3.55 to 3.62. Color, yellowish green to grayish green. Streak, grayish green. Occurrence, Lerida, Spain.

RUBY COPPER. Common name for cuprite.

SAFFLORITE. A cobalt diarsenide, usually cupriferous to the extent of 0.25 to 4.25%.

SALVADORITE. $FeSO_4.7H_2O.2(CuSO_4).7H_2O$. A hydrous copper and iron sulphate carrying circa 14.5% copper. Is near pisanite. Crystallization, monoclinic. Lustre, vitreous. Color, bluish green. Occurrence, Calama, Antofagasta, Chile.

SANDBERGERITE. A ferruginous, plumbiferous and zinciferous variety of tennantite, from Perú.

SCHULZENITE. Chemical formula probably $CuO.\ 2CoO.\ Co_2O_3+4H_2O$. A hydrous copper and cobalt oxide. Structure, amorphous. Fracture, conchoidal. Hardness, 3.5. Gravity, 3.39. Color and streak, black. Occurrence, Chile.

SCHWATZITE. A mercurial tetrahedrite, in which mercury replaces copper variably, usually to the extent of about 15% of the total. Gravity, 5.10. Lustre, dull. Color, dark gray to iron-black.

SERPIERITE. $3(Cu,Zn,Ca)SO+3H_2O$. A hydrous basic copper, zinc and calcium sulphate, containing 28.8% copper. Crystallization, orthorhombic. Color, bluish green. Is transparent. Occurrence, Laurium, Greece.

SIEGENITE. A nickeliferous variety of linnæite, frequently carrying small percentages of copper.

SMALTITE. Empirically cobalt disulphide, but frequently carrying copper in quantities from a mere trace to 3.25%.

SOMERVILLITE. $CuSiO_3.4H_2O$. A hydrous copper silicate, corresponding in formula with chrysocolla and asperolite, except as to excess of water. From Somerville, Somerset county, New Jersey.

SPANGOLITE. Chemical formula probably $(AlCl)SO_4.6Cu(OH)_2+3H_2O$. A basic copper and aluminum chlorosulphate, carrying circa 47.7% copper. Crystallization, rhombohedral. Fracture, conchoidal. Hardness, 2 to 3.

Gravity, 3.14. Lustre, vitreous. Color, dark green. Occurrence, Cochise county, Arizona.

SPANIOLITE. An imperfectly established variety of schwatzite.

STANNITE. Chemical formula probably $Cu_2S.FeS.SnS_2$. A copper, iron and tin sulphide, containing 29.5% copper, 13.1% iron and 27.5% tin. Structure, massive, granular and disseminated. Cleavage, cubic, indistinct. Fracture, uneven. Tenacity, brittle. Hardness, 4. Gravity, 4.3 to 4.5. Lustre, metallic. Color, steel-gray when pure, ranging to iron-black when impure, latter with bluish to yellowish tarnish. Streak, blackish. Occurrence, County Wicklow, Ireland, and Cornwall, England.

STELZUERITE. Chemical formula uncertain. A basic copper sulphate, closely related to brochantite. Crystallization, orthorhombic. Hardness, 3.5 to 4. Gravity, circa 3.9. Lustre, vitreous. Color, dark emerald-green to blackish green. Streak, lighter green. Is translucent to transparent. Occurrence, Chile, associated with brochantite and atacamite, and frequently mistaken for both.

STETEFELDTITE. A hydrous copper antimonite, carrying circa 12.8% copper. Structure, massive. Hardness, 3.5 to 4.5. Gravity, 4.12 to 4.24. Color, brown to blackish. Streak, shining. Occurrence, Nevada.

STIBIODOMEYKITE. $Cu_3(As,Sb)$. A copper arsenoantimonite containing circa 65% copper. Apparently is an antimonial domeykite. Crystallization, hexagonal in synthetic crystals, none being found in nature. Cleavage, none. Fracture, uneven. Tenacity, very slight. Hardness, 4. Gravity, 8.1. Lustre, metallic. Color, gray, with yellowish tinge, like domeykite. Streak, gray. Is soluble in nitric acid, with small residue of gray powder. Occurrence, Mohawk mine, Keweenaw county, Michigan.

STYLOTYPITE. $3(Cu_2Ag_2Fe)S.Sb_2S_3$. A copper, silver and iron sulphobismuthite carrying 28.3% copper and 8.1% silver. Apparently is an argentiferous and ferruginous bournonite. Crystallization, orthorhombic. Fracture, imperfectly conchoidal. Tenacity, brittle. Hardness, 3. Gravity, 4.8. Lustre, metallic. Color, iron-black. Streak, black. Occurrence, Copiapó, Chile.

STROMEYERITE. $(Ag,Cu)_2S$. A silver and copper sulphide, carrying 31.1% copper and 53.1% silver. Crystallization, orthorhombic. Fracture, subchonchoidal. Hardness, 2.5 to 3. Gravity, 6.15 to 6.3. Lustre, metallic. Color and streak, dark steel-gray. Occurrence, Chile, Perú, Siberia, Colorado, etc.

STÜBELITE. Chemical formula undetermined. A hydrous manganese, copper, iron and aluminum silicate, carrying circa 12% copper. Structure, massive, reniform and botryoidal. Fracture, conchoidal. Tenacity, brittle. Hardness, 4 to 5. Gravity, 2.22 to 2.26. Lustre, vitreous, brilliant. Color, velvet-black to pitch-black. Streak, dark brown.

STUDERITE. A varietal form of tennantite containing, as partial replacement of normal copper content, silver, lead, zinc and iron.

SUB-OXIDE OF COPPER. Cuprite in mineralogy; cuprous oxide in chemistry.

SYCHNODYMITE. $(Co,Cu,Ni)_4S_5$. A cobalt, copper and nickel sulphide, containing circa 14.5% copper. Crystallization, isometric. Gravity,

iron-black. Streak, grayish-brown to cherry-red. Opaque in quantity, but occasionally subtranslucent in very thin splinters, giving cherry-red transmitted light. Is soluble in nitric acid and fusible on charcoal. Occurrence, in most copper districts, but commonly is not regarded as a commercial ore, except when argentiferous, which frequently is the case.

THROMBOLITE. An imperfectly determined hydrous copper antimonate, carrying circa 31.5% copper. Structure, amorphous. Color, emerald-green. Occurrence, Rezbánya, Hungary.

TIEMANNITE. An imperfectly determined silver, mercury and copper selenide, carrying circa 8.8% copper. Occurrence, with eucairite and umangite, in the Sierra de Umango, Rioja, Argentina.

TORBERNITE. $CuO.2UO_3.P_2O_5.H_2O$. A hydrous uranium and copper phosphate, carrying 6.9% copper. Common name, uranium mica. Crystallization, tetragonal. Cleavage, micaceous, with brittle laminae. Hardness, 2 to 2.5. Gravity, 3.4 to 3.6. Lustre, pearly on cleavage planes and subadamantine on other faces. Color, emerald-green to grass-green. Streak, apple-green. Diaphaneity, translucent to transparent. Is soluble in nitric acid. Occurrence, Cornwall, Saxony, etc.

TRICHALCITE. $3CuO.As_2O_5+5H_2O$. A hydrous copper arsenate containing 34% copper. Structure, in radiated groups, columnar, also dendritic. Hardness, 2.5. Lustre, silky. Color, verdigris-green. Is soluble in hydrochloric acid. Occurrence, Russia.

TRIPPKEITE. (nCuO.As_2O_3.) A copper arsenite. Crystallization, tetragonal. Color, bluish-green. Is soluble in acids. Occurrence, Copiapó, Chile, in druses.

TRITOCHORITE. Cuprodescloizite.

TURQUOISE. A gemstone, essentially a hydrous aluminum phosphate, colored by 2 to 6% of copper, which probably is included as a hydrous basic copper phosphate.

TYROLITE. $CuO.As_2O_5.9H_2O$. A hydrous basic copper arsenate carrying 40.1% copper. Crystallization, orthorhombic. Cleavage, micaceous. Tenacity, highly sectile and flexible in thin laminæ. Hardness, 1 to 1.5. Gravity, 3.02 to 3.1. Lustre, pearly to vitreous. Color, verdigris-green to apple-green. Diaphaneity, subtranslucent to translucent. Occurrence, Libethen, Hungary, Utah, etc.

UMANGITE. Cu_3Se_2. A copper selenide containing 54.6% copper. Structure, massive. Cleavage, none. Fracture, subchonchoidal to uneven. Hardness, 3. Gravity, 5.62. Lustre, metallic. Color, dark cherry-red, with violet tinge on fresh fracture, soon tarnishing to violet-blue. Streak, black. Occurrence, with tiemannite and eucairite, in the Sierra de Umango, Rioja, Argentina.

URANIUM MICA. Common name for torbernite.

URANOCHALCITE. Chemical formula undetermined. A hydrous basic uranium and copper sulphate carrying circa 5% copper. Occurs in acicular crystals. Hardness, 2 to 2.5. Color, grass-green. Occurrence, Joachimsthal, Bohemia.

VALLERIITE. A sulphate of copper, iron, aluminum and magnesium.

Apparently is a mixture of covellite, pyrrhotite and several aluminous and magnesian minerals. Occurrence, Nya Kopparberg, Sweden.

VARIEGATED COPPER ORE. Common name for bornite.

VAUQUELINITE. Chemical formula probably $2(Pb,Cu)CrO_4.(Pb,Cu)_3P_2O_8$. A lead and copper phosphochromate carrying 3.9 to 10% copper. Crystallization, monoclinic; also occurs amorphous. Fracture, uneven. Tenacity, brittle. Hardness, 2.5 to 3. Gravity, 5.8 to 6.1. Lustre, adamantine to resinous. Color, apple-green to liver-brown. Streak, greenish to brownish. Diaphaneity, opaque to faintly translucent. Occurrence, Berezov, Russia.

VELVET COPPER ORE. Common name for cyanotrichite.

VENERITE. A hydrous copper, aluminum, iron and magnesium silicate containing circa 14% copper. Occurrence, Springfield, Berkshire county, Pennsylvania.

VERDIGRIS. Copper carbonate. Is formed from metallic copper by the action of carbon dioxide and moisture in the atmosphere. The verdigris of the pharmacist is a copper acetate and care should be taken not to confuse these widely varying compounds bearing the same name.

VESZEYLITE. Chemical formula probably $7(Cu,Zn)O.(P,As)_2O_5.9H_2O$. A hydrous copper arsenophosphate carrying circa 30% copper. Crystallization, monoclinic. Hardness, 3.5 to 4. Gravity, 3.53. Color and streak, greenish blue. Occurrence, Moravitza, Hungary.

VOGLITE. Chemical formula uncertain. A hydrous uranium, calcium and copper carbonate carrying circa 6.9% copper. Occurs in aggregations of crystalline scales. Lustre, pearly. Color, emerald-green to bright grass-green.

VOLBORTHITE. Chemical formula probably $(Cu,Ca,Ba)_3(OH)_2VO_4+6H_2O$. A hydrous basic copper, calcium and barium vanadate carrying circa 30.9% copper. Hardness, 3 to 3.5. Gravity, 3.55. Lustre, pearly to vitreous. Color, olive-green to citron-yellow. Streak, greenish yellow. Is translucent in thin splinters. Occurrence, Perm, Russia.

WARRINGTONITE. A varietal form of brochantite.

WHITNEYITE. Cu_2As. A copper arsenide containing 88.4% copper. Structure, massive, crystalline, very finely granular. Tenacity, malleable. Hardness, 3.5. Gravity, 8.4 to 8.6. Lustre, dull and submetallic on fresh fracture, strongly metallic when scratched, soon tarnishing. Color, pale reddish to grayish white, pale reddish white on a rubbed surface, tarnishing to yellowish bronze, brown and brownish black, sometimes with iridescence. Is soluble in nitric acid. Occurrence, Houghton, Michigan, Sonora, Mexico, and Chile.

WINKLERITE. Chemical formula uncertain. A hydrous cobalt, nickel and copper arsenate carrying circa 11 to 12% copper. Structure, amorphous, massive. Fracture, conchoidal. Hardness, 3. Gravity, 3.43. Lustre, dull. Color, bluish black to violet black. Streak, dark brown. Occurrence, Almeria, Spain.

WITTICHENITE. $3Cu_2S.Bi_2S_3$. A copper suphobismuthite carrying 38.4% copper. Crystallization, orthorhombic. Fracture, conchoidal. Hardness, 3.5. Gravity, 4.3 to 5. Color, steel-gray to tin-white, tarnishing to

pale lead-gray. Streak, black. Is soluble in nitric or hydrochloric acids. Decomposes easily on charcoal. Occurrence, Wittichen, Baden, Germany.

WÖLCHITE. A varietal form of bournonite.

WOLFSBERGITE. Chalcostibite.

WOOD COPPER. Common name for olivenite.

WOODWARDITE. Chemical formula uncertain. An aluminum and copper sulphate containing circa 38.4% copper. Is closely related to langite.

YELLOW COPPER ORE. Common name for chalcopyrite.

YPOLÉIME. Chemical formula perhaps $5CuO.2P_2O_5.5H_2O$. A doubtful hydrous basic copper phosphate of the dihydrite-pseudomalachite group.

ZEUNERITE. $CuO.2UO_3.As_2O_5.8H_2O$. A hydrous uranium and copper arsenate containing 6.1% copper. Crystallization, tetragonal. Fracture, uneven. Tenacity, brittle. Hardness, 2 to 2.5. Color, grass-green to emerald-green. Occurrence, Saxony and Cornwall, England.

ZINKAZURITE. Apparently merely a hydrous mixture of copper carbonate and zinc sulphate, from the Sierra Almagrera, Spain.

ZINKENITE. A lead sulphoantimonite, usually slightly cupriferous.

ZIPPEITE. Chemical formula undetermined. A hydrous basic uranium, copper and calicum sulphate. Occurs in acicular crystals and crusts. Hardness, 3. Color, lemon-yellow to orange-yellow. Occurrence, Joachimsthal, Bohemia.

ZORGITE. Chemical formula uncertain. A lead and copper selenide, carrying 4 to 15.5% copper and 41 to 64% lead, with traces of silver, mercury and iron. Structure, massive and granular. Tenacity, brittle. Hardness, 2.5. Gravity, 7 to 7.5. Lustre, metallic. Color, lead-gray. Streak, darker lead-gray. Occurrence, Cacheuta, Mendoza, Argentina.

CHAPTER IV.

THE MINING OF COPPER.

Large volumes have been written and printed regarding the general subject of ore extraction, and many smaller books have been issued on single branches of mining practice, such as timbering, pumping, use of explosives, etc. Under these circumstances it is obvious that merely an outline can be given, in a single short chapter on the subject of the actual extraction of copper and copper ore. In its main features copper mining is much the same as other branches of metalliferous mining, but there are some special features of interest.

Title to mining lands is secured and held in different ways in different countries. In England and her colonies, mining property usually is held either as freehold, when owned in fee, or as leasehold, when operated by other than the owner of the land. In most of the colonies, especially in the Australian states and in British Columbia, public lands are available for location, on terms favorable to mining operations. In the United States practically all of the land east of the Mississippi River is held by private owners, to whom pertain the mineral rights, as well as the ownership of the surface of the land. In the states and territories from the Rocky Mountains westward to the Pacific coast there are immense areas of mountainous mineral lands, owned by the government, and available for the location of mining claims. The full mining claim allowed by the United States laws is a parallelogram of 600 by 1,500 feet, with its longest dimension practically coincident with the axis of strike of some mineral body. Claims may be fractional, where the full size permitted cannot be secured because of surrounding claims previously located. The locator of a claim must make affidavit that he has found mineral in place, but this requirement is more honored in the breach than in the observance. There is no limit to the number of claims that may be located by a single person, firm or corporation. Neither is there anything to prevent other locators staking out claims impinging upon or covering claims previously located. In many mineral districts there is much litigation, owing to infringing claims. United States mineral claims are of two varieties, one known as a quartz or lode claim, previously referred to, and a second variety, of greater area, known as a placer claim, located for placer gold. The locator of a mineral claim on United States government land is required to do annual work, usually called assessment work, to the value of $100 on each claim, until the end of five years, when, upon satisfactory proof to the land office that $500 worth of work has been done, a government patent will issue for such lands. In the case of a group of contiguous claims, assessment work may be done, by shaft or tunnel, on a single claim of the group, instead of being divided among the individual claims. In actual practice a 10-foot tunnel or a 10-foot pit is considered equivalent to $100 worth of work, though ranging in cost from $35 to $50, as a rule. In Mexico and several others among the Latin-American coun-

tries, surface title does not carry the ownership of mineral values, which pertain to the state. No permanent titles to mineral properties are given in Mexico, but these are held subject to the payment of regular taxes of 10 pesos per pertenencia of one hectare area, and upon non-payment of taxes title to the lands is forfeited automatically.

The law of the apex in the United States is that the owner of a vein that outcrops at surface may follow such vein to any depth, at any dip, regardless of side boundary lines at surface. This law is the cause of endless confusion, and in some of the best mining camps, notably at Bisbee and Leadville, side-line agreements are made between the owners of different claims, by which they agree mutually that the law of the apex shall be waived. The law of the apex holds only in the mining states west of the Mississippi river, and is unknown in the Lake Superior district and other eastern mining fields.

Ore may outcrop at the surface, or may be overlaid by alluvium consisting of sand, gravel and boulders to depths ranging from a few feet to hundreds of feet. Ore bodies also may be overlaid by eruptions of rhyolite or similar flows laid down after the deposition of mineral values. Every property must be a prospect before it can be a mine, and prospects divide naturally into two classes, one showing outcrops and the other having its ore bodies covered by dirt or rock. Ore bodies not outcropping at surface may be proven by the use of the churn drill or diamond drill. The diamond drill has a hollow cylindrical bit, set on its inner and outer edges with black diamonds. This bit is rotated by means of pipes connecting with the machine above, and bores a hole of hundreds, or if necessary, of thousands of feet, in depth, cutting a core that gives a complete record of the formation penetrated. In soft ground no solid cores can be secured, and in such cases it is necessary to collect rock cuttings from the sludge that falls from the mouth of the hole, water being forced into the bottom of the hole under pressure to remove the chips and rock dust. The churn drill cuts no core, but is valuable for exploratory purposes, in most cases being cheaper than the diamond drill for shallow borings.

Unknown ground may be proven also by test-pits or trenches. Test-pits, usually shallow, sometimes are sunk for several hundred feet in depth, and may be made into permanent shafts. In the Lake Superior district, where nearly all of the shafts are sunk on inclines, at the angles of dip of the cupriferous beds, it is customary, in opening mines on beds covered with heavy drift, to sink temporary vertical shafts through the alluvium and from twenty to fifty feet into the solid rock. From the bottom of such a temporary shaft a crosscut is run to the desired bed, and the permanent shaft frequently is opened to surface by means of an upraise, after which the permanent shaft is deepened on the bed. A sand shaft is a shaft sunk through sand to the rock ledge, and frequently is very difficult in sinking. A drop shaft is one that is sunk through sand or alluvium by weights piled on the top of the timbering. The bottom is shod with steel, to facilitate its descent through the soft material, and new timbers are framed in at the top, until the solid rock is reached.

Copper mines may be divided into two classes, according to their system of opening. The first of these is the quarry or open-cast mine, while the other is a mine proper, with subterranean openings. In working

mines open-cast it frequently is necessary to remove the overburden of alluvium, sometimes of considerable depth, preparatory to quarrying the ore. Some of the open-cast mines are worked exclusively as quarries, and others in combination with underground openings, where ore broken down in large open pits is milled through winzes to tunnels beneath, for removal in tram-cars. The mine of the Utah Copper Company, in Bingham, Utah, is worked in benches, by steam shovels, this plan being rendered possible by the enormous size of the ore body, which is a mountain of cupriferous monzonite.

By far the greater number of copper mines, as well as mines of nearly all other minerals, are developed by strictly underground openings. The underground mines fall into two classes, the first being those opened by adits or tunnels, and the second those that depend upon shafts for ore extraction. Tunnel mining, so called, is where the principal avenue of ore extraction is through a practically horizontal opening, commonly called a tunnel, though more properly termed an adit, as, strictly speaking, a tunnel opens to the surface at both ends. The tunnels are given a slight rise from the portal, to provide drainage, and also to obtain the aid of gravity in removing loaded cars. The principal advantage of tunnel mining is that it permits cheap development and extraction, by reason of requiring no pumps or costly machinery for hoisting. In mountainous districts tunnels frequently give good backs—that is large ore bodies above the tunnel level. A disadvantage of development by tunnel is that it sometimes operates to restrain development at a greater depth, because of the hesitation of the mine managment in making the heavy outlay required for hoisting machinery and pumps. Many copper mines are combinations of tunnel and shaft mines, having been opened by tunnel originally, and deepened later by shaft.

All underground openings in a mine may be divided into three classes, of which the first includes the openings made upon a practically horizontal plane, while the second includes the openings that range from a very flat dip to vertical. The third class includes stopes and chambers of varying size and trend.

The horizontal openings include not only the adits and tunnels previously referred to, but also plats, drifts and crosscuts. A plat is the beginning of a drift, cut out beside a shaft. A drift is like a tunnel except that it starts from some underground opening and usually is smaller in size than a tunnel. A crosscut is an opening on a horizontal plane like a drift, except that it runs across an ore body instead of with it. The word level is more comprehensive than the word drift and includes all horizontal openings on that particular plane, such as adits, tunnels, plats, drifts, crosscuts, stopes and chambers.

The second class of openings, includes shafts and winzes, the shaft being a connection, or the beginning of a connection, between levels. The old system of mining levels usually were 10 fathoms or 60 feet apart, and sometimes even closer. Modern mining practice usually puts levels at 100 foot intervals, and occasionally levels are placed 150 feet apart, in which case sub-levels are driven when necessary.

Of the third class of mine openings, a stope is any excavation bounded by horizontal openings that is available for ore extraction.

is applied also to the chamber left by extraction of the ore. Stoping is the actual mining of ore, as distinguished from opening work, which merely provides the preliminary underground passages necessary to actual ore extraction on a considerable scale.

The reopening of an old mine is a task that is both nasty and dangerous, owing to rotten timbers and mine openings filled with water, usually with considerable rubbish at the bottom of the shafts. Frequently such reopening work must be done by the aid of defective mine maps, or without any maps whatever. Old shafts frequently are cut down to larger size, the cutting down being a process of enlargement and retimbering.

Shafts frequently are vertical, and may be sunk at any angle corresponding with the dip of the ore body that is being developed, though in actual practice shafts rarely are sunk flatter than an angle of 25° with the horizon. Shafts usually are divided into compartments by timber cribbing. Sometimes the cribbing is open, and again very close. The various compartments are utilized for hoisting, for ladders providing ingress and egress, and for air-pipes, water-pipes and wires. The ladderway usually is timbered off solidly from the other compartments, and usually has sollars, or landings, at stated intervals, for both convenience and safety. At all levels there usually are platforms with openings just large enough for the cages, or skips, to pass through. An air-shaft is one that is used for purposes of ventilation only, being either a shaft sunk for that sole purpose, or an old shaft otherwise useless. A blind shaft is one that does not come to the surface, usually connecting with a tunnel. An upraise is a winze or shaft, or the beginning of either, made by working upward. The upper workings of a mine frequently are in soft rock, or ore softened by oxidation, and such openings require heavy timbering for safety. In the case of mines opened on soft veins having strong walls there is considerable advantage in sinking the incline shaft in the footwall, at a depth of 25 to 75 feet under the ore, the shaft following the same dip as the vein and running parallel therewith. In the case of a vertical shaft there is a similar advantage in sinking in the footwall and crosscutting for the ore body, unless the depth and dip are such that this plan necessitates crosscuts of prohibitory lengths.

Vertical shafts have guides in each compartment, along which the cage travels. The cage is merely a rough elevator, and hoisting commonly is done in counterbalance. This may be accomplished by the use of a single drum with a fleet-gear, or by hoisting with a split drum. In the case of a very deep vertical shaft with hoisting done by cages in counterbalance, tail-ropes running from the bottom of each cage around a sheave-wheel in the bottom of the shaft prevent excessive vibration. Hoisting in vertical shafts usually is done in cages, which raise the loaded tram-cars and lower the empty cars from surface, but a comparatively recent development is the Kimberly skip, which is swung under the cage. The Kimberly system calls for one, two or even three skips, swung under the cage. The skips discharge automatically into bins, on reaching the surface. The utilization of the Kimberly system of hoisting in deep vertical shafts increases their capacity by 25 to 50 per cent., according to circumstances.

As a rule incline shafts sould be sunk at a constant angle, while

drifts should follow the ore, as far as practicable. Hoisting from incline shafts is done in skips, which are iron boxes with square bottoms and tops built at such an angle that the mouth of the skip is approximately level while on the skip-track. The skip-track is of steel rails, usually laid on wooden cross-ties, the weight of the rails depending on the size and capacity of the skip.

At the surface of a shaft the first equipment may be an "armstrong" windlass—that is, one worked by hand power. The next stage is a horse-whim or whip, followed by a pony hoist, operated by steam or gasoline, and the last stage calls for permanent hoists, these ranging up to thousands of horse-power in capacity in some large and deep mines. For an open pit a derrick with mast and boom may be used for hoisting ore in a bucket. The simplest headgear over a shaft is a tripod of three sticks of timber. The next stage is a gallows-frame, which may be small or large, and of wood or steel, the tendency at the larger mines being strongly toward building all important surface structures with steel frames. Shaft-houses, which are enclosed structures, may be of wood or steel, with a decided preference for steel. In the Lake Superior district the shaft-houses usually have in connection rock-houses, where the preliminary crushing is done. In hoisting with a bucket this swings free in a vertical shaft, while in an incline shaft the bucket rides skids, or, preferably, a trolley cable. The present maximum capacity of skips and cages is about twelve tons of cargo. In deep shafts the weight of a skip or cage and the cable attached thereto is fully equal to the weight of the load hoisted, but by working in counterbalance the disadvantage of these excessive weights is reduced greatly. Hoisting is done mainly by steel cables, composed of strands, each built up of numerous steel wires, slightly twisted. In some districts flat steel cables are used. Cables should be inspected at regular and frequent intervals, and all defective ropes removed, as the constant strain of torsion ruins the strength of the best of cables in time. Care should be exercised in preventing short turns, as these are very damaging to the life of the wire. Large sheaves and drums of large diameter, with minimum changes of direction, add greatly to the life and safety of steel cables. The engine-houses containing the hoists almost invariably are set on the footwalls of the mines, partly for safety and partly to obviate short bends in the hoisting cables.

In shallow mines the workmen go up and down on the ladderways, while in deep mines the men ride in the cages of the vertical shaft, or in the case of incline shafts, ride to and from their work in skips, or, in some mines, on man-cars especially built for carrying mine-workers. The old style of man-engine, which was highly efficient in its day, has gone out of use.

A competent engineer is as necessary to a mine as to a railroad, and good maps are equally important. While a competent civil engineer can do fair work in mine surveying, and some excellent mining men have had merely the training of civil engineers, a special course in mining engineering is much to be preferred. The work of a competent chemist also is of great importance in most copper mines, and in small mines the engineer usually serves as chemist also. Any mine that can employ a dozen men can afford the services of an engineer and chemist combined—in fact cannot afford to do without. In many small mines the superintendent is

chemist and engineer, and possibly also bookkeeper and supply clerk, and there are cases on record where to these accomplishments the mine manager added the blacksmith's trade as well, but that is almost too much talent for one man to possess. The records of old mines usually are deficient in reliable maps, but modern practice is very thorough as to engineering and mapping, and blueprints are extended monthly, from accurate data obtained underground.

While the general public uses the term miners for all underground workmen, this term is reserved in actual practice for the skilled workmen who do the drilling and blasting. Mine timbering is skilled work that is done sometimes by the miners, and sometimes by special timber gangs. The muckers, or trammers, are the men who do the shovelling and rough labor of the mine. Some large properties have special shot-firers for blasting. Miners may work by the day or on contract, contracts being divided into two general classes, the first being opening work, which consists mainly of shaft-sinking and running drifts. The second class of contract work is stoping, the latter being the actual breaking down and extraction of ore in considerable quantities. Contract work is preferable in nearly every case where possible, and gives more satisfactory results to both miners and mine-owners, as it secures more work to the owners for the money paid, and also gives larger earnings to the good workmen. In the case of contract miners the supplies furnished by the mine, such as candles, detonators, fuse, dynamite, etc., usually are charged at much more than cost, such prices sometimes running two or three times the actual cost to the mine. On the face of it this practice is a great injustice to the miners, but in actual work is defensible on the ground of results. It has been shown by actual trial that the average contract miner is careful or careless of supplies in proportion to their cost, and as the excessive use of supplies is a dead loss that eventually must be shared between the miners and the owners, anything that operates to bring about economy is an advantage to both parties.

Most copper mines work two or three shifts. The double shift mines usually work shifts of ten hours each, but in mines giving the eight-hour day it is customary to work three shifts, thus utilizing the entire twenty-four hours. There is economy in keeping underground work going at top speed, with double or triple shifts, the fixed charges and many of the heavy expenses on surface being the same in either case.

Mining, at best, is a dangerous calling, and when not surrounded by proper safeguards is extra hazardous. The copper mines make a good showing among the metalliferous mines of the world, in their proportion of fatalities, and in the leading districts the precautions taken result in keeping down the percentage of mortality to a fairly low basis. The principal cause of accidents, responsible for more than half of all the deaths, is the carelessness of the miners themselves. Human nature is so constituted that the average man becomes habituated to danger that is met with in the course of his daily work, and miners fall into shafts and winzes, or step from stagings through sheer carelessness. Of the semi-avoidable sources of accidents, falling ground is responsible for more than half the deaths. This source of trouble is called semi-avoidable for the reason that, with care, accidents from this cause can be greatly reduced, though not

entirely eliminated by even the utmost vigilance on the part of both men and management. Missed holes or premature explosions are responsible for many horrible accidents and deaths. Poor fuse is more dangerous to miners than dynamite, and wise managers scrutinize the quality of their fuse as closely as they investigate the safety of their hoisting cables. Accidents through riding in skips are unpleasantly common. In many mines there is a rule that miners shall not ride to or from their work in skips, but this rule seems made to be broken, and serves merely as an excuse to the management when accidents occur. It is much better to shoulder the responsibility, as many managements have done, and permit the men to ride in the skips with such safeguards as can be furnished.

Ankylostomiasis, or the hook-worm disease, is found in but few copper mines, but seems to be spreading, and should be guarded against. The spread of this disease is greatly facilitated by dampness.

The methods by which ore is extracted vary greatly, the principal factors determining the method to be used being the nature and size of the ore deposits, and the character of the walls. Most mines are irregular as to both the size and value of their ore bodies, which vary from point to point, in dip, strike and tenor, and the walls of ore bodies frequently are poorly defined. Sometimes there is a selvage of fluccan, very soft clayey material, along either or both walls. Faults are noted frequently, and the ore body may be thrown in any direction by a fault, or series of faults, or may be cut out temporaily by a dyke, or may be divided by a horse, or may come to a final end against a different formation. In other cases the ore body may continue as a vein, while losing its mineral values when passing into a different country rock. Veins also fork and come together. Superincumbent strata are apt to creep, especially in a limestone formation, on a mountain side where the strata are deeply tilted, such mines requiring heavy timbering and constant care. Heavy pillars of vein rock usually are left standing beside the shafts, and sometimes elsewhere in the mine, as supports for the rock above. When a mine is considered worked out it is customary to rob the ore from the pillars and permit the mine to cave in, but sometimes nature caves in the mine before the owners get around to the job.

By the caving system of mining superincumbent rock and drift are permitted to fall into the mine, a litle at a time, the process being practically continuous. The shafts are protected by heavy pillars, or, preferably, are sunk in the solid footwall and the ore body reached by crosscuts. Mining is begun on the top level, which is timbered lightly, being secured just enough to permit the safe extraction of ore values. While stoping is in progress on the upper level, drifts are being run on the level below, and a plat cut from the shaft for a third level. The various levels are stoped in order, from the top down, no reserves being left in the levels that are stoped, as these begin caving almost as soon as the work of stoping is finished, and sometimes before. In a mine worked on the caving system the stoped out levels above are constantly coming in, and the miners at all times are working under caving ground. Notwithstanding the apparent danger of this plan, the mines worked on the caving system average fully as safe as those worked by the older methods, and the plan has decided advantages for many mines. It is not, however, adapted to all mines, and

a modified system, in use at a few properties, bids fair to increase, especially in the Lake Superior district, where some of the older and deeper mines are experiencing much trouble from air-blasts and similar troublesome phenomena coincident with very deep mining. This modified plan of the caving system calls for the sinking of shafts, preferably in the solid footwall, and drifting on each level to the extreme length of the territory to be exploited. A seven-by-seven drift, well timbered, is too small an opening to seriously endanger caving. Stoping is begun on the top level, at the extreme end of the drift, and stopes are timbered but lightly, stoping working backward toward the shaft, and the ground is permitted to cave behind the miners. By this plan of mining stoping must begin on the upper levels, and continue in steady order toward the bottom of the mine. This plan is thoroughly sound in theory, and, while not in general use, seems certain to grow in popularity, and to give satisfactory results in mines that would be dangerous to work on the old plan.

Ore is blocked out when it has been opened on three sides, and ore in sight, strictly speaking, is ore that has been blocked out, but this term is sadly misused, in many cases, and incidences are not lacking where small mining companies, with stock for sale, have claimed millions of tons of ore in sight, on the strength of a fair outcrop on the surface and a hundred feet or so of shaft or tunnel.

Timbering may be of wood, rock or concrete, but as a rule is of wood. The increasing scarcity of good timber, with consequent rise in price, in most parts of the world where copper mining is followed extensively, is causing vigilant mine managers to utilize other material to an increasing extent. The use of concrete and cement has reached the highest point in Germany, but is gaining ground in the mining fields of many other countries. Timbering may be heavy or light, according to circumstances. Some copper mines, like the Calumet & Hecla and Copper Queen, are forests of timbers, while others, like the Osceola, have but very little timber outside of that required for skip-roads and ladderways in the shafts. Heavy timbering is required from surface to the solid rock ledge, when passing through alluvium. There are many different methods of timbering with wood, but the one in most general use and favor is known as the square set system. A square set of timber has a bed-piece, two legs and cap of the same length, usually eight feet, mortised and tennoned. A similar set at eight feet distance is connected with bed-pieces and caps, and these cubicles may be extended indefinitely in any direction. Lagging usually is placed above the cap-pieces of a square set to prevent the falling in of rock from the roof, and in soft ground bulkheading is required, this necessitating the driving of heavy sticks of 8-foot timber into the ground on either side, to form a solid bulkhead. False sets are used at times, and sprags are utilized frequently. The use of dry-walling is increasing. Dry-walls are built of waste mine-rock, laid without mortar, and when carefully built are very effective in holding the ground above, and have the advantage of disposing of waste rock that otherwise must be hoisted. Ore is anything that will pay to extract for its metallic values, and varies greatly in different fields, and under different circumstances. In some of the Lake Superior mines rock carrying an average of one per cent. copper pays millions in dividends, and rock carrying even one-half of one per cent.

metallic copper is treated at some properties, though the average of the mine necessarily is higher. In other fields ores that carry ten per cent. copper are unprofitable, because of narrow veins, lack of transportation or other serious drawbacks. In Australia the soft mullock broken in the mines is used for filling in cribs, by what is known as the pig-sty system. Concrete seems especially useful for finishing the collars of shafts, and has been tried for the sleepers of skip-tracks, but seems somewhat rigid for the latter use. Courses of brick have been used for finishing the collars of shafts in the Lake Superior district. Steel, mainly in the form of worn-out rails, cut down to short lengths, is used to a considerable extent for timbering in some mines. There is no question that concrete must be used to an increasing extent in mine timbering.

The matter of disposing of water is a problem of importance with most mines. Tunnel drainage is possible with properties opened exclusively above the adit level, and, with mines partly opened by shafts and partly by adits, the water is discharged through the lowest tunnel level. Occasionally large vugs are encountered underground, and small mines have been flooded from the waters contained in such cavities. Limestone, so often met with in copper mines, is readily permeable by water, and one mine may drain an entire basin of considerable area. Good mines are lost sometimes because of the excessive cost of keeping them free of water.

Where a mine must be kept unwatered otherwise than by natural drainage through adits or tunnels, the water may be removed by pumping or bailing. Mine pumps may be divided into two classes, these being movable and stationary. Station pumps usually are of large capacity, and are set permanently in underground stations prepared for them, while sinking pumps are placed on skids and lowered in the shafts by chains or steel cables as required. The great majority of both station pumps and sinking pumps are actuated by steam or compressed air, usually the latter, though steam may be used in shallow mines before the installation of air compression plants, or in a great emergency, but the carrying of steam to a considerable depth is impracticable, owing to excessive condensation. Electric pumps are increasing in numbers and efficiency, and with further improvements should prove the ideal variety of pump for most underground uses. Air-lifts and pulsometers are used to some extent, mainly for sinking purposes. Water also may be removed from mines that have filled through idleness or that have been flooded accidently, by bailing. The bailers, which replace buckets, cages or skips, usually are large cylindrical tanks, frequently old steam boilers, with a valve bottom, and, at a pinch, ordinary skips may be used. The method of unwatering mines by bailing is used only in emergencies, though some attempts have been made at utilizing bailing for regular mine drainage.

All mines show an increase of temperature with depth, after the first few hundred feet of the earth's crust is penetrated, but the rock temperature varies greatly in different fields. The Lake Superior copper mines, which are the deepest of any mines in the world, are not so hot at similar depths as the mines of most other fields. At the vertical depth of 4,920 feet the rock temperature in the Red Jacket shaft of the Calumet & Hecla was 87.6° Fahrenheit, but this has been reduced, by connection of the

lower levels with other shafts, and by the utilization of compressed air exhaust from the rock-drills. Many sulphide ore mines are extremely hot, owing to the gradual oxidation of sulphur.

Copper mines contain neither choke-damp nor fire-damp, those deadly gases found in coal mines, but nitrous oxide fumes from dynamite are poisonous, and are difficult to dissipate in workings having only one open end. Powerful fans at surface sometimes aid in ventilating the dead workings of deep single shafts. The general use of power-drills, actuated by compressed air, assists materially, not only in furnishing fresh air in dead workings, but also in reducing the temperature in deep mines, as air yields up considerable latent heat when compressed, and robs all surrounding objects of heat when released from compression. In mines of more than a few hundred feet in depth nature provides a system of ventilation as soon as two shafts are connected underground, the shallower shaft becoming a downcast, through which the air is sucked down, with great force, while the deeper shaft—that is the one having its collar on the highest ground at surface—becomes an upcast. The deeper the shaft the stronger the draft, for the same reason that a high chimney gives a stronger draft than a low one. In deep shafts the air currents so called into being are so strong that it is necessary to provide air-doors in the connecting levels.

Fire is a danger to which practically all mines are subject. Even a fire on surface may endanger underground workmen, through the destruction of the hoisting plant, or headgear, and fire from a structure over the shaft may enter the mine by working down the timbering. Underground fires may be divided into two classes, the first occuring in sulphide mines where the ore itself furnishes the fuel, while the other class occurs in mines with heavy timbering that is liable to burn. Heavy damage to a mine, accompanied by serious loss of life, may occur through either form of fire. Timber fires are caused mainly by the carelessness of miners in disposing of candle-ends, lamp-wicks, matches and partially burned tobacco from pipes.

In the Calumet & Hecla mine, which has suffered losses aggregating millions of dollars through five serious mine fires in the past quarter century, great precautions are taken, not only to prevent the occurrence of fires, but to put out mine fires immediately after their inception, and to prevent the spreading of fire throughout the mines. Masonry bulkheads, fitted with fire-doors, permit the cutting off of different portions of the mine. Electric signals and telephones furnish the means for turning in prompt alarms, and water-pipes and fire-hose are kept at underground stations for the fighting of fires that have gained a foothold.

All mines containing large bodies of ore rich in sulphur are liable to spontaneous combustion, but this danger can be minimized by various precautions, though not obviated entirely. The danger of spontaneous combustion is enhanced by the fissuring caused by improper support of ground opened or stoped, as such fissuring produces considerable quantities of pulverized sulphides that are subject to unusually rapid oxidation, and are liable to spontaneous combustion. The St. Lawrence mine, at Butte, Montana, has been on fire for nearly a score of years. There also have been serious fires in the United Verde, Iron Mountain, Wallaroo & Moonta and

drills, but that in most common use has two cutting faces crossed at right angles. Drills are dulled rapidly, and require frequent sharpening, for which purpose they must be taken to the smithy, on surface. Hand drilling has given way in most properties to power drilling, the machines being actuated by compressed air or electricity, the former agent being in very general use in most important mines. The water-drill is a form of drill, actuated by compressed air, in which a jet of water is fed through a hole in the centre of the steel bit, to lay the dust produced by the drill. The power drill is fixed on a tripod or pillar, to afford solidity, and power drills are worked frequently on timber stagings and rock ledges that would seem inaccessible to anyone but an experienced miner. Electric drills have given unsatisfactory results in many mines where tried, though working excellently in a few properties. The trouble with electric drills is due, probably, to inefficient designing in some makes, and to even a larger extent to inefficient handling, rather than to any inherent defect in the theory of the machine. A set of holes for one blast is known as a round. Much skill is shown by old miners in drilling such holes, which must be driven at such angles, to such depth, and in such number as to break the proper amount of rock with a minimum expenditure of labor in drilling, and with a minimum charge of dynamite for blasting. A skilled miner, who takes full advantage of cleavage, jointing and bedding planes, of varying strengths of different rock forms, and of fundamental principles of physics, will accomplish better results, with half the drilling and half the powder, than can be secured by a beginner or an ignoramus.

Ordinary gunpowder, commonly known to miners as black powder, is useful for blockholing, which is breaking up large masses of rock previously broken, and occasionally for other uses, but dynamite is the principal underground explosive. This consists of nitro-glycerine, taken up by some absorbent, usually wood-pulp, sawdust or diatomaceous earth. The strength of dynamite varies greatly, and should be gauged according to the nature of the rock. Some of the newer high explosives are used also, to a limited extent, in copper mines. In blasting, the dynamite cartridges, which slip easily into the holes bored for them, are placed at the bottom of the holes, in such quantities as required, and in the pasty top of the final cartridge is inserted a copper cap or detonator, holding a single drop of fulminate of mercury, with the end of a fuse firmly fixed within the end of the cap. The fuse is fired by a match or candle, it being timed by the length to which it is cut, and when the fire in the core of the fuse reaches the fulminate of mercury there is a sharp explosion, which in turn explodes the dynamite. Occasionally charges of dynamite fail to explode, and as a round of holes consist of five to a dozen borings, the dynamite in one or two holes may fail to explode. Such missed holes are highly dangerous, and frequently cause explosions later, when the dynamite is reached by the drill in boring other holes. When a mine is worked with a ten-hour shift, blasting is done twice per shift, as a rule, the blasting being timed at about a quarter-hour before the close of the half shift and full shift, this providing an hour and a quarter for the dynamite fumes to dissipate from the workings. Dynamite, fuse and detonators usually are kept underground in boxes, sometimes in large quantities, and carelessness in handling is responsible for very serious accidents at times.

When broken, the ore, or rock, or both must be disposed of, usually by hoisting both ore and worthless rock to surface, except where underground selection is possible, in case waste-rock is used for dry-walling or fills. In the old system of mining the long-handled shovels in the hands of muckers were the main reliance, ore and rock being loaded into tram-cars of wood or steel, which were pushed from the face of the workings to the shaft on light T-rails or strap-rails. In modern practice rock frequently is sent down, through chutes, to bins on the level below the one where broken. The chutes may be of wood or iron, and chutes built of rock are used in some mines. Broken ore or rock usually will clear itself in a chute of 30° to 35° dip, and even with less dip in the case of an iron chute.

Underground haulage plants are used in a number of the larger and more progressive mines, though this system is suitable only to properties that have long hauls, and large ore bodies on the levels where such haulage plants are installed. Underground tramming by power is done by locomotives, actuated by compressed air or electricity, steam locomotives not being suitable, owing to the confined scope of operations, where smoke and gases from the boiler would poison the underground atmosphere. Underground loading-bins are coming into use, and these, which are installed at the shaft, on the various operating levels, permit the trammers to discharge their cars into the bins, and skips can be filled from the chutes of the bins as required. This system obviates delays both in tramming and hoisting, and has much to commend it. A hoisting system installed recently at the Wolverine mine provides for special workmen known as car-dumpers. The trammers leave loaded cars at the shafts, and the dumpers discharge these into the skips, beginning at the top hoisting level, and working down, level by level, to the bottom, then riding up in the skips and beginning anew. In sinking deep winzes the shovel is the main reliance in disposing of ore or rock, which must be shoveled up from stage to stage, in the most laborious manner, unless a donkey-hoist is installed to care for the dirt. For this reason upraises are preferable to sinking, in the opening of winzes, as a rule.

In early days the heavy mass copper of Lake Superior mines, ranging in weight from a ton to 500 tons per mass, was cut up into chunks not too heavy for hoisting, by the use of long-handled chisels, this process being laborious, slow and costly. The work of cutting up masses underground is now done with pneumatic chisels, at about a tithe of the former cost.

The span of life of any mine is a matter of vital importance to its owners, but no general rule can be given for gauging the life of copper mines, as each property is a problem with varying factors that must be worked out individually. The Rio Tinto is the oldest active mine of the world, and until the discovery of the monzonite-porphyry ore bodies at Bingham, had the largest proven ore reserves of any mine of any metal, notwithstanding its having been worked for some three thousand years. The Lake Superior copper mines, operating on stratified beds, will hold indefinitely in depth, but the depth to which successful mining may be done cannot be predicted with any degree of certainty.

CHAPTER V.

The Milling and Concentration of Copper.

As native copper and copper ores usually occur disseminated in gangue rock, the first process of reduction after the ore is brought from the mine is one of concentration. Milling really should begin in the mine, and a little care on the part of the mine superintendent often eases the burden of the mill superintendent and brings about cheaper and closer extraction. The use of excessive charges of dynamite in blasting not only is a waste of explosives, but results also in the making of an unnecessary quantity of fines, causing an excess of slimes in the mill, with consequent labor and expense in extraction, and unnecesarily heavy losses. The mine superintendent also can aid the millman greatly by sending with his ore the minimum quantity of wood, drill-steel, hammer-heads and other material that is rather unpleasantly common in the average ore that reaches the average mill.

The general principles of milling are the same in the concentration of all ores, but local practice varies greatly, according to the nature of the ores of various districts. The practice in general use in the native copper mines of Lake Superior is given at the end of this chapter.

Mills usually are built as near the mines as possible, to save long hauls on ore, and frequently are located immediately at the mines, though at times it is necessary to build the mills at some distance from the workings in order to secure adequate water supply. As a rule mills are located in mountainous districts, where full advantage can be taken of the steep slopes, and modern mills are so planned and constructed that the raw ore is dumped into bins at the top of the structures, and passed gradually through the various processes, the final concentrates being discharged on the lowest terrace, thus taking full advantage of gravity. The elevation of material, once common in all mills, is reduced to a minimum in modern plants, which are nearly automatic, and require much smaller forces of workmen, who, as a rule, are skilled men that understand why as well as how. In most cases a ready-made mill is a serious mistake—the same sort of a mistake that would be made by the laying out of shafts and drifts for a mine by engineers who never had seen the property. Every mine has individual problems that can be solved satisfactorily only by the man on the ground, if he be a competent miner, and the same observation holds as true of the milling as of the mining, at most properties. Much of the trouble in mill practice arises from faulty designing, often where good mill men, either technical or practical, or both, plan mills to treat ores from an unfamiliar district. Local peculiarities require local adjustment in milling practice, and it frequently is the case that what is the best practice for the milling of ore from one mine is not exactly suitable for the milling of ore from even an adjacent property. This matter of local variations is one that cannot be treated except in the broadest outline, or in the fullest detail. The best modern mills are now designed, with great care, to treat the specific ore of an individual property, and careful de-

signers frequently make extended mill-tests, and other experiments, before designing either the structure or equipment of a mill. As a result of this care, losses have been greatly reduced at the best mills, and tailings now run nearly as clean as the slags from a well managed smelter.

There is a general haziness regarding the matter of rating milling capacity. It would be well if this could be removed, and that it should come to be clearly understood that a 100-ton mill was designed and equipped to treat advantageously 100 tons of material daily, and that any considerable excess over this quantity of ore, while it might be run through, could not be handled so as to secure thoroughly satisfactory extraction. The average designer is apt to underrate the capacity of his mill, probably under the mistaken impression that a mill rated at 100 tons that proves capable of treating 125 tons satisfactorily is a credit to his professional reputation. The best results never are secured from any machinery that is run to the fullest limit of its capacity. In many cases a hundred-ton mill may be made to put through 150 tons of material, but the work will be slighted at nearly every stage, and the losses will be correspondingly heavy.

Too much stress cannot be laid upon the practical coördination of every process in the mill. Each particular department should have sufficient capacity to handle, to advantage, its due proportion of material, this capacity necessarily decreasing toward the end, as the ore becomes concentrated, and an increasingly large amount of gangue has been eliminated.

Occasionally there arise difficult problems in handling materials of widely varying specific gravity. As a case there may be cited the Shannon mill, in Arizona, which treats ores have the following specific gravities: chrysocolla, 2; azurite, 3.5 to 3.8; malachite, 3.7 to 4; chalcopyrite, 4.1 to 4.3; chalcocite, 5.3, and cuprite, 5.8 to 6.1, while the specific gravity of the quartz gangue is 2.64. While this is an extreme case, it is by no means uncommon for a mill to treat ores of two or three widely varying gravities. It is now possible to handle successfully mixed ores that were worthless even as recently as the close of the Nineteenth Century, because of the impossibility of satisfactory separation. Zinc, especially, is removed from copper ores much more readily than formerly.

In the concentration of ores, hand work is used exclusively at some of the smaller mines that are distant from smelters, where the ores must be brought to a high copper tenor by hand selection. Even in the case of mines having good mills, a limited amount of hand selection may be used to advantage, and hand-cobbing, by which worthless gangue rock is separated from valuable ore, may relieve the mill of considerable work. Many mills have picking-tables or picking-belts. The best form of picking belt is one that carries the material past the workmen, who remove the valuable ore for further treatment, while the worthless material remains on the belt and is dumped automatically at the end, or vice versa. Magnetic separation is used, with success, in a number of copper mills, where the material to be removed is magnetic, or can be made magnetic by roasting.

For almost every milling operation there is a choice of machinery, or process, or both, and advocates of these different processes or devices usually are loud in the praises of their pets. While some machines are better adapted than others to certain uses, more depends upon the entire milling system being planned with a view to treatment of the particular ore

handled, and the intelligent carrying out of the theory into practice, than upon the make of the machine that is employed, though this is by no means unimportant. A good millman will secure fair results from indifferent machinery, while an inefficient millman will obtain poor results from good machinery, either through poor grouping or inefficient handling. Only the man on the ground, and he only after repeated experiments, can intelligently adjust even a good mill to fully satisfactory work.

Owing to scarcity of water in many copper mining districts, where it must be used and husbanded with great care, settling ponds are provided, and some great economies are effected, not only in repeated usings of the water, after clarification, but also in minimizing the gross amount of water required for milling ore. The Detroit mill, at Clifton, Arizona, makes extensive use of settlers, and requires only about 300 gallons of fresh water per ton of ore treated.

Large storage-bins for ore are of much advantage to a mill, and the disadvantage of small storage-bins becomes apparent, shortly, to the superintendent of every mill that is so unfortunate as to have them. Large storage capacity for raw ore affords a balance wheel, and takes up slack that otherwise results in occasional mill stoppages, due to temporary mine stoppages, or even to a decrease in the day's output of the mine. Large storage capacity for concentrates is desirable also, in some cases, though not so important as storage capacity for raw ore.

Modern milling practice pays greater attention than formerly to both extremes, beginning with the coarse concentrates and ending with the slimes, and the classification of ore is carried out far more thoroughly than formerly. The advantage of removing concentrates as coarse as possible is that by so doing extensive sliming is obviated. At every operation by which ore is reduced in size, slimes are produced. Some ores slime much more readily than others, according to their structures, but all ores are more or less susceptible to sliming, and sliming easily can be carried to excess by poorly devised milling processes.

Crushing may be done either wet or dry. Where dry crushing is in use a great deal of fine dust gets into the air, and this should be removed by an exhaust fan. On very heavy material it is advisable to divide the crushing into two, and possibly three, operations, as no jaw-crusher can break masses of rock or ore to minimum size advantageously. Crushers are of many makes, but are essentially of two classes, one being the jaw-crusher and the other the gyratory crusher. There is a difference of opinion as to which causes the most sliming, but it is probable that a smaller percentage of slimes is caused by gyratory crushing, in most cases. The jaw-crusher is in more general use, however, than the gyratory. Rolls are used to a considerable extent in milling copper ores, but are not employed so generally as in the reduction of lead and zinc ores.

It is advisable to use a grizzly or trommel between each process of reduction, and the use of a grizzly before the first crushing will remove a considerable percentage of fines from average ore. The intelligent use of grizzlies or trommels not only obviates excessive sliming, but also saves the labor and power that otherwise would be used in unnecessary crushing of fine material. Revolving screens or trommels are of different styles and makes. These usually are of the same diameter throughout, but occasion-

ally are built tapering, though the uniform size seems more satisfactory, as a rule. The material delivered to such screens is carried to the lower end of the trommel by gravity, aided by the rotary motion of the screen. The openings in the screen, through which ore falls, may be of uniform size, from end to end, or may be divided into two or even three sizes of openings, giving the same number of sizes of concentrates. More inclination is required on coarse material than on fine, and more in dry screening than wet. Revolving trommels will handle ore satisfactorily down to particles of two to three millimeters in size, and impact screens will do good work on lumps of ore as small as one millimeter in size. Perforated metal is preferable to woven wire for screens, as the perforations are very slow in wearing, while the woven wire is quite certain to give openings of irregular dimensions after the screen has been used for a short time.

After crushing the ore is passed over jigs, of which there are a great many different designs, though the essential principle is the same in all, the gangue, which is lighter than the ore, being driven off by rapid oscillatory or vibratory movements of the bed of the jig, aided by the force of running water, the vibration and water jets being so carefully regulated as to permit the ore to remain on the bed of the jig while the worthless gangue rock is washed away. No matter how carefully this work may be done a little ore is lost in the tailings and a little rock remains with the concentrates . The Hancock jig has the greatest capacity of any make, and its use is increasing outside of Australia, where it was invented. While not suited to all grades of ore, there are many copper ores on which it can be used to advantage. The jigs usually are worked in series, and are divided for the handling of two or three different sizes of material, these being known as roughing jigs, middling jigs and finishing jigs, or having other names, according to different local usages, for the coarse ore, middlings or raggings, and fines. There is much more regrinding of both middlings and tailings than formerly, and there is much better machinery available for this purpose than even a few years ago.

The treatment of slimes varies greatly, in different mills, but, as a rule, the slimes are put over patented concentrators or tables, of which the Wilfley seems the most effective and in most general use. The Wilfley grades the fine ores and separates them from the finely crushed gangue rock by means of an inclined table having riffles covering about one-half of the surface, these being arranged along a diagonal line from corner to corner, the table having a slight oscillatory movement. Circular tables also are used to some extent. Screen sizing usually is stopped at about three millimeters, and hydraulic sizing begun. This is very effective, in most cases, but is not suitable for fine slimes that already contain an excess of ore, these requiring settling tanks. There is one make of hydraulic classifier, of considerable promise, that utilizes air-jets in connection with water. Hydraulic classifiers are of considerable variety in form, but usually have "V" or "W" shaped bottoms, whence the settled fines are drawn off, through plugs, for further treatment. Slime tanks also are in use in many mills for the final collection of fines. Filter presses are used but slightly for copper milling, though in common use in many gold mills. One of the greatest advances made in milling practice, since the beginning of the century, lies in the far greater saving of slimes, as compared with the older practice.

In the matter of sampling, the old and highly inefficient rule-of-thumb

plan has been discarded, in all modern mills. There are several excellent makes of automatic samplers, that do very accurate work, but, of course, these samples must be assayed both honestly and carefully in order to take advantage of the information that they offer regarding losses in tailings. It is probable that the losses in tailings in old mills were considerably greater than ever were shown by the grab-samples taken under the old methods.

The fines and slimes from the mill are finely comminuted, hence usually require briquetting before smelting, as otherwise a large proportion would be blown out of the furnace as flue-dust. A small quantity of lime, or some other suitable material, may be used for a binder, in briquetting, but this is not necessary in all cases, and in some instances fines and slimes from the mill are briquetted in connection with flue-dust from the smelter, preliminary to furnace treatment.

Oil concentration has been experimented with extensively, but is not yet fully accepted in milling practice, though some excellent results have been secured. In nearly every instance where oil concentration has been carefully tested, the technical results have been very satisfactory, but in many cases the process has not proven commercially available. Given a fairly steady and copious supply of material suitable for oil concentration, there seems no sound reason why the process should not prove a commercial success. There are several processes of oil concentration, but the original and most important is the Elmore system. By this process the ore is first pulped, then passed through a horizontal rotary drum, provided with cross-blades that lift and drop the pulp while propelling it along the drum. With the pulp is admitted a small quantity of viscous oil, left as a residue from the refining of petroleum. This oil, which is the best for the purpose, and also possesses the advantage of cheapness, selects the ore while rejecting the gangue rock. The oiled pulp is discharged, automatically, into spitzkasten, in which the tailings of gangue rock settle down and flow off, while the oil containing the fine ore floats and is drawn off from the top of the spitzkasten, into a centrifugal extractor that removes the oil, which is again used, the loss of oil in the process being quite small.

Various forms of pneumatic concentrators have been devised, from time to time, but none seem to have scored a marked success, though the theory seems good, and pneumatic concentration may become a success, eventually.

Electric concentration has been attempted, at various times and in various ways. The most promising of the electric processes, to date, provides for the utilization of static electricity. Finely crushed ore and gangue come into contact with a metallic surface, charged statically, which repels the particles of high conductivity, while those of low conductivity are retained for a sufficient length of time to be drawn aside and discharged into a separate receptacle. This process, while it does not appear to have come into use, would seem to possess intrinsic merit, for the separation of mixed ores of chalcopyrite, sphalerite and galena, which are of such common occurrence, intimately intermixed, in many fields.

In the Lake Superior district, where copper is found native, the milling process differs somewhat from any in use elsewhere, the principal feature of difference being in the crushing of ore by steam stamps. The native

metal occurs mainly disseminated in small particles through amygdaloidal or conglomerate rock, in quantities averaging only 15 to 30 pounds of copper to the short ton of rock in the amygdaloid mines, and averaging only 45 pounds of copper in the richest conglomerate mine. The metal sometimes occurs in masses that weigh from a few pounds up to hundreds of tons each. The larger masses are cut underground into pieces sizeable for hoisting, and when arrived at surface, are hand-cobbed, to eliminate as much as possible of the adhering gangue, and then put directly into the reverberatory furnaces for smelting.

The preliminary work of a stamp-mill, in the Lake Superior district, is done in the rock-house at the mine. This usually is built in connection with the shafthouse, though one rock-house may care for the production of two shafts. The ore is dumped from the skips, or cages, onto the upper floor of the rock-house, where the small masses are cobbed under steam-hammers, and the balance of the ore, containing fine copper disseminated through gangue rock, is passed over a grizzly, the larger masses going through a powerful jaw-crusher, the product of which descends to the next floor and there is put through smaller crushers, going thence to bins, from whence it is drawn into railroad cars and taken to the stamp-mills.

The modern stamp-mills are of fireproof construction, having steel frames, with cement floors, and are liberally supplied with windows for lighting. The buildings are terraced, so as to take full alvantage of gravity in handling the material treated. The storage bins at the tops of the mills, are connected with trestles, which permit the access of loaded trains, and the bins are of great capacity, holding thousands of tons of rock in the larger mills. Picking-belts are used to some extent in some of the mills.

The first stamps in the mills of the Lake Superior district were of the old Cornish style, crushing by gravity alone. The Ball head is a single stamp, operated by steam, and the entire stamp, including mortar-box, is one machine, set upon a very heavy foundation. Formerly heavy timbers were placed between the foundation and the mortar-box to furnish vibration, but these were found undesirable, and the practice has been discontinued. The ordinary steam-stamp has a piston of 18 to 20 inches diameter, with stroke of about 24 inches, the piston developing a velocity of about 25 feet per second and striking blows of three to four tons, at the rate of 90 to 110 strokes per minute, under a steam pressure of 95 to 120 pounds per inch, in the case of the simple heads, which are driven by engines of 150 to 250 horse-power each. The weight of the reciprocating parts of a steam stamp averages about 5,500 pounds. The economy in steam consumption possible through compounding the simple stamps being readily apparent, cross-compounding was tested thoroughly at the Champion mill for about a year. The results proved a large economy in steam consumption, but the very considerable disadvantages inherent in working four 500-ton stamps as a unit proved too great, and the system was abandoned. The cross-compound stamp was followed by the Nordberg steeple-compound stamp. This has high and low pressure cylinders, mounted tandem one above the other, and in actual practice the steeple-compound stamp has given an increased capacity averaging about 25 per cent., with a saving of about 25 per cent. in fuel. At the beginning of the last decade of the

Nineteenth Centeury the average crushing capacity of the simple steam-stamp in the Lake Superior district was 350 tons per 24 hours. This has been increased by heavier parts, greater power and the discarding of timber foundations, to 500 and even 600 tons per diem. The steeple-compound stamp is of much greater capacity, one stamp in the Osceola mill having crushed 779 tons of amygdaloid rock in 24 hours, in 1906, with an average for two weeks of 600 tons per day, including all stops. The capacity of the stamps varies considerably, at the different mills, according to the nature of the rock crushed. The conglomerate rock of the Calumet & Hecla is much more refractory than the amygdaloidal rocks of the other mines, and a stamp can treat only 60 to 65 per cent. as much conglomerate as amygdaloidal rock. The conglomerate also is much harder upon stamp-shoes than the amygdaloid. These shoes are of chilled iron, cast by local foundries, which are able to give an 11-inch chill, a statement that may be doubted, but is susceptible of full verification. The shoes weigh about 800 pounds each when cast, but lose half of their weight and become badly worn in four to fourteen days, according to the nature of the rock crushed, and are then discarded. Rock is fed under the stamps in pieces ranging up to a foot or fifteen inches in extreme dimension, with a smallest dimension of about four to six inches.

The system of coarse stamping now in general use was begun at the end of the Nineteenth Century. This process utilizes mortar-grates for discharge having perforations of about ten-sixteenths inch in size, as against the old standard of about three-sixteenths inch only, while revolving screens, with aperatures of about four-sixteenths inch, let out the fines and return the oversize to auxiliary machinery for recrushing. The coarse stamping system has resulted in giving about 50 per cent. of the mill product from the stamps, before jigging, as against 10 per cent. extracted at the heads under the old method, thus affecting important economies in the amount of material handled in stamps and jigs, and reducing the quantity of slimes.

From the stamps the crushed rock is fed to jigs, which are in series, taking coarse and fine sands from the stamps. A portion of the coarse sands, discharged as tailings, is recrushed and rejigged. Various types of regrinding mills are in use, including Chilean mills and other forms. The cost of regrinding Calumet & Hecla conglomerate, which is extremely refractory, has ranged as high as 30 cents per ton in Chilean mills, but in Huntington mills the cost has been cut to 10 cents per ton. The fines and slimes are passed over slime-tables of various patterns, these including the old-style Evans round-table, frequently with two or three superimposed decks, to save floor space, and the Wilfley and Overstrom patent tables, which have given very satisfactory results. The waste sands are washed through launders to some distance from the mill, while the concentrated metal, with its adhering gangue-rock, known locally as mineral, is shipped to the smelters for reduction. Formerly the mill practice of the Lake Superior district called for dressing mineral to a high percentage of metallic contents, but modern practice yields mineral much lower in copper tenor, and the losses in tailings now average only about one-half as much as at the beginning of the last decade of the Nineteenth Century. The mineral produced by the Lake Superior mills varies greatly, ranging

from 50 to 80 per cent. in copper tenor. Most of the mills make several different grades of mineral, these varying in size of material, and also in richness, the coarser grades carrying the larger percentage of copper. In some of the mills the coarser mineral is hand-picked for particles of silver.

Water consumption has been reduced about one-third through coarse stamping and other economies. Owing to unlimited water supply, and the enormous capacity of their pumps, the Lake Superior mills have been very prodigal of water in their washrooms. In the last decade of the Nineteenth Century as much as 10,000 gallons of water was used for washing a ton of ore, but this consumption has been reduced to an average of about 7,000 gallons per ton, and it is evident that considerable further economies are possible.

Owing to the compounding of stamps, resulting in greatly increased crushing capacity, some of the older mills have been unduly crowded in their washrooms, with consequent losses in tailings. The newer mills provide a much larger area of washroom for each stamp, thus allowing for the greatly increased stamping capacity of each head.

The tailings of the Lake Superior mines range from 0.15 to 0.75 per cent. in copper tenor. These figures are low, but are not as low as might be wished, in view of the low average tenor of the original ore. Great improvements have been effected, however, and the losses in tailings now average no more than half those of twenty years ago. Many attempts have been made in the district, and are being continued at the Calumet & Hecla, at reworking the tailings, but so far none have proven commercially feasible. The stamp-sand from the mills is utilized locally for mortar, in building construction, and is excellently adapted to that work. The stamp-sand also is used in making sand-lime brick, and for the manufacture of paving blocks.

CHAPTER VI.

The Hydrometallurgy of Copper.

Readers desiring a detailed exposition of this subject are referred to Eissler's excellent volume entitled "Hydrometallurgy of Copper." This chapter will be found to give a fairly complete outline of the subject, but without any attempt at great detail.

The extraction of copper values from ores by simple leaching processes has been known for many centuries, and probably was discovered by some of the earliest followers of mining and metallurgy. Leaching processes vary, according to nature of the ores, and in minor details. The simplest process is that by which the water from sulphide copper mines is compelled to precipitate its copper values on scrap-iron, after reaching surface. Plants for leaching cupriferous mine waters are simple, usually, and the process is essentially the same, wherever used. At Butte the water from the mines carries .0015 to .0065 per cent. copper, and the seepage water from the tailings piles is very much richer. The oxidation of chalcopyrite in tailings is very slow, but chalcocite and oxidized ores leach much more rapidly. The tailings piles at Butte are leached by water, conveyed in ditches over the surface of the piles, and such leach-water, after leaving the tailings, goes from pond to pond, and then is pumped to precipitating tanks, in series of two or three with grades of 1 to 240 at the beginning, and 1 to 50 at the end, the copper being precipitated on scrap-iron, tin cans and other iron waste, the product being cement copper running from 30 to 90 per cent. in copper tenor. The product resulting from the precipitation of copper from cuprous sulphate solutions upon scrap iron is a very impure mixture of metallic copper with iron, antimony, arsenic, silica, etc., and is washed, sometimes repeatedly, before reduction to blister copper in blast-furnaces.

Lixiviation is especially adapted to sulphide ores of low grade, but not all low grade ores can be handled advantageously by leaching, as it is not adapted to ores containing considerable quantities of ferrous oxide, manganese or lime, while the leaner oxides, carbonates and disseminated sulphides having quartz gangues are especially suited to lixiviation. The initial outlay for a leaching plant is comparatively small, but the process is slow, and, to be even fairly complete, requires much time, for long continued leaching, in the case of average ores. Where applied on a very extensive scale, as in Spain, the principal disadvantage is the locking up of enormous quantities of ore, entailing a heavy investment, but this disadvantage, when once overcome, affords compensation by reason of the immense amount of material in process of leaching acting as a sort of balance wheel, rendering it possible to forecast production to a far greater extent than in the case of mines using ordinary concentration and smelting processes of reduction.

The mines of the Sierra Morena, in Spain and Portugal, have been worked intermittently for about three thousand years, and immense piles of low-grade sulphide ores and refuse have accumulated. As these weath-

ered, the sulphides became oxidized gradually, and natural lixiviation was brought about by the rains. The bulk of the copper so leached out was lost, but it was learned, at some remote time in the past, that the copper values could be saved by depositing scrap iron in the path of the leach-water. This process of securing copper from sulphate solutions is now in use at many old and idle copper mines as well as at active properties, in various parts of the world.

The process of natural cementation is well exemplified at the San Domingos mine, in Portugal, where the low grade sulphide ore is cobbed to three or four inch size, and piled in immense heaps, 15 to 40 feet in height, which are provided with valleys for drainage, with brick chimneys at intervals. Pipes are laid over the surface of the heap, and water is applied copiously, at intervals. The water draining from the heaps is collected in sluices, and the metal, carried in solution as copper sulphate, is precipitated on scrap-iron. Some of the heaps at the San Domingos contain as much as a million tons of partially leached low-grade ore, and require eight to ten years for the complete extraction of values to the point of impoverishment where further work, by even this phenomenally cheap plan, is unprofitable.

A modified method, which might be termed artificial cementation, was employed for a long time at the Rio Tinto mine, in Spain, but has been succeeded by a process that will be described later. By this old method broken ore was piled in roast-heaps, called teleras, in quantities of 1,000 to 1,500 tons per heap, the ore ranging from 1.5 to 2 per cent. in copper tenor. The heaps were fired, burning slowly for three to six months, after which the ore, then uniformly and thoroughly roasted, was placed in cement tanks, each about 5 feet deep, 35 feet wide and 100 feet long, provided with false bottoms of square timber. The leach-water from these tanks ran into settling tanks, where the copper was deposited on pig-iron. After five or six successive leachings the ore was removed and piled in heaps, called terreros, and weathered again for further leaching. At one time the Rio Tinto had about seven million tons of low grade ore in terreros, for further leaching.

The present leaching process in use at the Rio Tinto differs somewhat from the method previously described. The bulk of the copper values of the Rio Tinto is contained in chalcocite, distributed in pyrite, and not in chalcopyrite distributed through iron pyrite, as formerly held. The first process in the leaching of low grade ores is exposure to air and moisture, which form some ferrous sulphate, that oxidizes to ferric sulphate, which reacts, with considerable rapidity, on the iron copper sulphides, producing copper sulphate and iron sulphate. About half of the copper values contained originally are changed into the form of sulphate within six months, the final reaction producing copper sulphate and sulphuric acid. About two years are required to extract 80 per cent. of the half of the copper remaining in the leach-heaps after the first six months of leaching.

At the Rio Tinto a site is chosen for a leach-heap where the ground is concave and sloping, to permit the leach-liquor to run out from the base of the heap. The first step is the building of a network of air-flues, with an internal diameter of about one foot, connecting every 50 feet with vertical chimneys built of rough stones. The ore, crushed to not larger than [illegible] size, is spread alternately, in lumps and fines, to a height of about [illegible]

and the surface is leveled, each completed heap containing approximately 100,000 tons of ore. The surface of each heap, after levelling, is formed into squares, by means of ridges of mineral, these serving to distribute the water locally. A system of gutters is arranged for running water over all parts of the mass, and water is run on as the heap is built up. The ore oxidizes rapidly, the temperature of the air in the chimneys rising to 170° to 180° Fahrenheit, and at the latter point the chimneys are closed, to check too rapid local oxidation, and to promote the slow and thorough oxidation of the entire heap. The pile of ore changes to a brownish color, due to the hydration of the yellowish, basic ferric salt. Great care is required to prevent firing the heap, as fire once started is very difficult to extinguish. When oxidation has proceeded as far as safe, water is supplied, at the rate of 50 cubic meters per hour, until the soluble copper is leached out, after which the heap is allowed to oxidize naturally, and the process of leaching is repeated. After about one year the squares on the surface of the heap are rearranged, and gutters are shifted. At the edges of the heap the mineral has become cemented, holding a considerable quantity of copper salts, and the edges are dug down into terraces, and the copper extracted therefrom by washing. When the copper contents have been reduced to about 0.3 per cent., the heap is considered thoroughly leached, and the residue, containing an average of 49.5 per cent. sulphur, is exported as washed sulphur ore.

The copper liquor, as it runs from the heap, has considerable ferric iron in solution, and, to remove this, the liquor is run over a smaller heap of ore, known as a filter bed, laid in a reservoir formed by a masonry dam thrown across a small ravine. The filter bed greatly reduces the quantity of ferric iron carried in solution, and the leached liquor is then run to the cementation tanks, reaching the tanks containing, per cubic meter, about 4,000 grams of copper, 1,000 grams of ferric iron, 20,000 grams of ferrous iron, 10,000 grams of free sulphuric acid and about 300 grams of arsenic, a total of about 3.5 per cent. carried in 96.5 per cent. water. The liquor is run from the reservoirs, at about 300 cubic meters per hour, through the precipitation tanks over pig iron, producing cement copper, the process of cementation being facilitated by warm weather. The precipitation tanks are arranged in series, on the slope of a hill, the leach-liquor passing forward and back, and being discharged from the lowest tank practically free from copper, but containing considerable ferrous iron and free sulphuric acid. This waste liquor coming from the cementation tanks, called salida, is pumped back and mixed with fresh water, for further use on the leach-heaps. Each series contains three parallel tanks, which are about 2¼ feet deep, 5½ feet wide and 320 feeet long, the slope at the bottom varying from one in five hundred, in the first series, to one in ninety in the last series, added velocity being provided in the final series to overcome the tendency of the free sulphuric acid to attack the pig iron more rapidly as copper is deposited from the solution. The tanks are built of lumber and the spaces between them filled in with stone and cement. No metal is used in the construction of the tanks, wooden plugs being used for joining the timbers. Cracks between the boards are filled with oakum and pitch, to render the tanks water-tight, and at each end of each tank there is a drop-door. The tanks contain about one ton of pig iron for each foot of length.

The precipitate is taken daily from the tanks, the cement copper being removed from one tank at a time. The rough precipitate is taken to the

cleaning and concentration plant, where the precipitate is cobbed from the pig-iron, which is replaced for further use. The crude precipitate so secured, containing an average of about 70 per cent. copper, is fed onto a perforated copper plate, through which it is washed by a strong jet of water from a small nozzle, into a long launder, material not passing the perforations being removed and hand-sorted. The precipitate passing into the launder is washed and concentrated, by the velocity of the water, into different grades. The first few yards of the launder produce a red precipitate, known as No. 1, that assays about 94 per cent. copper and under 0.24 per cent. arsenic. This is followed by No. 2 precipitate, assaying about 92 per cent. copper and between 0.3 and 0.75 per cent. arsenic, while No. 3 precipitate, at the far end of the launder, consisting of very fine grains, averages only about 50 per cent. copper, and up to about 5 per cent. arsenic, including also graphite from the pig-iron, and some antimony and bismuth. Nos. 1 and 2 precipitate are bagged for shipment to the refinery, and No. 3 is moistened with acid liquors, made into balls by hand, dried in the sun and then smelted and bessemerized in the ordinary manner.

A system of combined roasting and leaching, in use in the Sierra Morena district of Spain, consists of roasting copper sulphides with ferrous iron sulphate, which reduces the copper to the form of sulphate, after which it is leached. Iron sulphate is produced extensively in the ordinary cementation process.

Copper sulphides may be converted into chlorides in various ways. By one process the sulphide copper ores are treated with ferric chloride, or with ferrous chloride and hydrochloric acid, decomposition being hastened by saturating the ores under treatment with calcium chloride or sodium chloride, both cheap and common chemicals. Another process, which is quicker, and gives closer extraction, though costlier, consists of roasting the raw sulphide ores with the addition of about 1.75 per cent. salt. The ore so treated is roasted in teleras, after which the chlorurized ore is leached in vats, and the residuum placed in terreros, for further weathering and leaching. A modification of this process is in use near Pittsburg and at several other American points.

The Doetsch leaching process is not in present use, though once employed extensively at the Rio Tinto. By this process raw sulphide ores were mixed dry with about one-half per cent. of ferrous sulphate and salt, the ore being broken to half-inch size and built up into large heaps having channels and chimneys for ventilation. The weathering process required about two years, and about 80 per cent. of the copper contained was secured by leaching and cementation.

The Hunt & Douglas process is a modification of the Doetsch process, but none of the chloride processes are in very general use.

The earlier wet process of Langmade, improved by Henderson in 1860, and since modified slightly, is in quite extensive use in Great Britain. This system is designed for the extraction of small copper values from the cinders remaining from cupriferous pyrites after burning for sulphur used for the making of sulphuric acid.

Metallic copper is slightly soluble in cyanide solution, the solubility being in direct ratio to the fineness of comminution. Copper carbonates and oxides, in small quantities, have a deleterious effect on the cyanide treatment of gold ores, decomposing the solution rapidly. Copper taken into the

solution to a point where affecting its strength for gold solution can be precipitated electrolytically.

A patented hydro-electrolytic process is planned to leach copper direct from the ore and deposit pure metal electrolytically from the solution. By this process ore first must be crushed to size passing a 40 to 80-mesh screen, then calcined and leached in tanks in a solution containing 6 to 10 per cent. of sulphuric acid. It is claimed that one ampere of electrical energy will precipitate one ounce of copper in 24 hours, but this process does not seem to have passed the empirical stage.

New processes of lixiviation for copper ore are numerous, and many new systems have been patented, in different countries. Some of these new processes call for involved and intricate reactions, possible in laboratory experiments, but difficult of carrying out in the actual extraction of copper on a large scale commercially. A fault common to many new leaching processes is that materials too costly in price are required, and such processes, while technically correct, are unavailable commercially by reason of high cost. In practically all developed copper fields only the low grade ores are adapted to leaching, all ores of medium and high grades being treated by smelting, with or without preliminary concentration. Only the cheapest materials are available for leaching processes that will prove commercially successful, and the only two chemicals that seem to have met the tests as to strength and cheapness are salt and sulphuric acid, with salt losing ground in this field, in which it once disputed supremacy with the acid.

CHAPTER VII.

The Pyrometallurgy of Copper.

Smelting, or the reduction by fire, of metal from ore, has been known to mankind from prehistoric times. The reduction of copper to metallic form is effected by three methods, or combination of methods, these being hydrometallurgy, where leaching processes are employed, pyrometallurgy, where fire is the reducing agent, and electrometallurgy, with electric energy as the agent of reduction. The greater part of the world's copper production is secured with the aid of fire by smelting, but the rough copper so obtained is refined, as a rule, by electrolysis. This chapter is devoted to smelting in its various branches.

The antiquity of copper smelting is evidenced by the finding of copper and bronze in tombs and disinterred cities of very great age, and it is obvious that the copper must have been smelted, because the ancients are not known to have possessed mines of the native metal. The secret of smelting never was lost, but was handed down from generation to generation, and spread from country to country. In Europe there were copper smelters, at very early periods, in Germany, Austria and Sweden, it being obvious that the metallurgical practice of these works was derived from the Romans.

In Great Britain there are fugitive historical references to copper smelters early in Plantagenet times, and it is altogether probable that smelting was done, in a primitive manner, on tin ores, many centuries before the Christian era, and that the improved metallurgical practice introduced to the island by the Romans was never lost entirely, through the troubulous centuries preceding the welding together of numerous petty principalities into one nation, under Alfred the Great, in the year 900. In the Swansea district the earliest recorded smelter is that of the Mines Royal works, dating from A. D. 1584, though it is known that these works were preceded by still earlier smelters. The Taidach works date from 1727, and in Cornwall, copper smelters at Hayle date from early in the Eighteenth Century. The Welsh and English were the first to engage in copper smelting as an independent industry, the practice, from time immemorial, having been to smelt the ore at or near the mines, in primitive works under the same ownership. As a result of the establishment of independent works that bought ore from many mines, the Welsh smelters progressed more rapidly in metallurgical knowledge than their competitors and gained great skill in treating refractory ores. As a consequence of this progress Swansea became the seat of the greatest diversified smelting industry on the globe, the location of the city being favorable for the receipt of ore and matte from foreign countries. The smelting industry of Swansea, though still large and highly diversified, is of much less importance than formerly, the decadence of Welsh smelting having been aided, beyond doubt, by the arbitrary restrictions imposed upon the producers of the ore, for at the height of their prosperity the Swansea smelters drove very hard bargains

with the miners. For a long ton, twenty-one hundredweights of one hundred and twelve pounds each were demanded and received, in addition to which an allowance of three and one-half pounds on three hundredweights was exacted for "draftage," and allowances also were claimed for moisture. No new smelters have been built at Swansea since 1867, though perhaps nearly three-fourths of the world's copper output was smelted at that point about the middle of the Nineteenth Century.

The smelting of copper dates from time immemoral in China, Persia and India, and Japanese smelting was begun about the Seventh Century of the Christian era. In Japan the large and highly important modern copper smelting industry now in existence may be said to date from about 1890, when the first modern machinery and equipment were installed at a Japanese plant.

The change of base of the copper smelting industry of the world dates from about the middle of the Nineteenth Century, when the development of highly important copper industries in Lake Superior, Chile, Australia and South Africa led to the building of smelters near the mines. The smelting industry, so far as copper is concerned, has reverted to the ancient practice of thousands of years, interrupted for a couple of centuries by the rise of the Welsh smelting industry, and the reduction of copper ores is carried on now, as a rule, at or near the mines, though, in the case of electrolytic refining, the greater portion of the rough copper is refined at long distances from the smelters.

In Chile the first reverberatory furnaces were built in 1842, at Coquimbo, by Charles Lambert, and Lambert, who was an extensive operator of Chilean mines, opened the Port Tennant works at Swansea, in 1852, to escape the intolerable exactions of the Associated Smelters. From this declaration of independence may be said to date the decline of the Welsh smelting industry. Charles Lambert built the first Chilean blast-furnaces, at Coquimbo, in 1857, but these were not entirely successful. Chile now has a number of modern smelters, though none of the first magnitude, and a considerable amount of ore continues going to Swansea for reduction.

In Australia the first smelter was built at Port Adelaide, South Australia, in 1851, and the second was erected at Wallaroo, in the same state, in 1861. The first smelter in New South Wales was built in 1874, at Lithgow, and the first in Queensland was built, in 1888, at Aldershot, a suburb of Maryborough, while the first smelter in Western Australia was not constructed until after the opening of the Twentieth Century. In Tasmania the first copper smelting was done at a plant on the east bank of the Derwent, at Smelting Works Bay, shortly previous to 1860, but these works do not seem to have proven a success. The modern works of the Mount Lyell, which are exceeded in size by many plants, but in efficiency by none, date from 1896.

In the United States the smelting industry was slow in gaining a foothold, partially because of the policy of England in forbidding the smelting of copper ore in the colonies. There was a limited production of ore from mines in New Jersey, Vermont and elsewhere, during the Eighteenth Century and in the early decades of the Nineteenth Century, but the first American smelter of which authentic records have been found was the Revere works, at Port Shirley, Boston, Massachusetts, having cupola furnaces, which were built in 1835. The company owning the works was reorganized in 1851, and continued business as a copper smelter until 1868, and remains

in business with a copper rolling mill, though no longer a smelter. It is asserted by Nicol Brown, an eminent English authority, that a copper smelter was built by Crocker Bros. at Taineston, Maine, in 1836, but there is no town by this name in the state of Maine, and verification of the statement has not been obtained. The first thoroughly successful American smelter was built, in 1845, at Baltimore, by the Baltimore & Cuba Smelting & Refining Co., to treat Cuban ores. This plant had reverberatory furnaces, operated by Welsh smeltermen, and treated ores from Cuban mines, and later from South American mines, that previously had been shipped to Swansea for reduction. This plant, now under the ownership of the Baltimore Refining & Smelting Co., remains in existence, and has been in continuous and successful operation for upwards of sixty years.

The New Haven Copper Co. built a small smelter at New Haven, Connecticut, in 1846, and from the opening of this primitive plant dates the great copper and brass manufacturing industry of the Naugatuck Valley, now the first in this line. In New Jersey a small but good copper smelter was built in 1846, at Bergen Point, and this small beginning has resulted in the building up of the enormous copper smelting and refining industry now found on the New Jersey coast along New York Bay. The Orford works, at Constable Hook, New Jersey, were built in 1881, this being the first strictly modern plant in New Jersey.

The beginning of the Lake Superior industry may be said to date from the construction of a small smelter at Pittsburg, Pennsylvania, in 1848, by Hussey & Howe. This proved fairly successful, and the affiliated firm of Hussey & Co. built a copper smelter for Lake Superior ores at Cleveland, Ohio, in 1850. In the same year the Detroit & Lake Superior Copper Co. built a smelter at Detroit, Michigan, and shortly after the same company built the first Lake Superior smelter at Hancock, Michigan, this being located in the heart of the Lake Superior copper district.

The southern copper smelting industry dates from 1854, when two small blast furnaces were built at Ducktown, Tennessee, a reverberatory furnace being built at the same point in the following year. The copper industry of Tennessee was extinguished, temporarily, in 1863, by the American Civil War, and modern copper smelting in that state may be said to date from 1890, with the advent of the Ducktown Sulphur & Copper Co., which has been a leader in the development of successful raw sulphide ore smelting. In North Carolina a small blast-furnace was built at the Ore Knob mine in 1876.

The earliest western copper smelting was done in California, circa 1855, but the bulk of the Californian copper ore production of that day went to Swansea for smelting, and the Californian copper industry suffered almost complete extinguishment shortly previous to 1870. Modern copper smelting in California dates from 1896, when the Mountain Copper Co. erected a fine modern plant at Keswick, in Shasta county. In Arizona some crude smelting was done at an early date, but modern smelting was begun in the Clifton district of Graham county, circa 1873. Copper smelting in Utah is a comparatively recent affair, though this state now has some of the best works to be found anywhere.

In Montana the first smelter was built at Butte, in 1880, by the Boston & Colorado company, and reverberatories for matting were built in the

same year by the Parrot mine, and the Meaderville smelter of the Montana company was constructed shortly afterward.

The smelting of copper has made greater progress since the middle of the Nineteenth Century than in all the centuries intervening since the discovery by primitive man that metal could be obtained from copper ore through heat, and this progress is shown in no more striking manner than by the increase in furnace capacity. About the middle of the Nineteenth Century the capacity of an average reverberatory furnace was circa seven tons per diem, while in 1902, the capacity had reached three hundred tons. The blast-furnace had increased, by the year 1900, to a daily capacity of three hundred tons, while in 1907 the capacity of the largest blast-furnace, at the Washoe works, was two thousand seven hundred tons.

In smelting gold and silver ores it usually is necessary to provide a metallic carrier for the precious metal values, the proportion, by weight, of the gold and silver being so small that it is necessary to collect these metals in some other metal of less value, but found in the ore in larger quantities. The preference, until recently, has been for lead, as a collector, but there is a marked tendency, noted since the beginning of the present century, to substitute copper for lead.

Copper melts at about 2,000° Fahrenheit—2,043° according to Plattner—or approximately 1,100° Centigrade. When heated within 200° of the melting point the metal becomes brittle and friable. Copper, when fluid, at white heat, is of a beautiful sea-green color, and volatilizes slowly, combining with oxygen to give a green flame.

The old method of smelting called for reduction of the ore to metal by six stages. In the first stage the ore was roasted in a reverberatory furnace, with the addition of about 15 per cent. of fuel. In the second stage the roasted ore was smelted, with flux and fuel, to a matte of about 35 per cent. copper tenor. In the third stage the low-grade matte was roasted in reverberatory furnaces, with the addition of about 40 per cent. fuel. The fourth stage called for the smelting of the roasted matte, with the addition of about 50 per cent. fuel, to white metal of about 75 per cent. copper tenor. In the fifth process the white metal was resmelted, in reverberatory furnaces, with about 60 per cent. of fuel, to blister copper. The sixth and final process called for the refining of the blister copper by a sucession of partial oxidations. The process of bessemer smelting usually is applied to the conversion of high grade matte, as hereinafter explained, but consists essentially of any reduction of ores by means of an oxidizing atmosphere, and both pyritic smelting and semi-pyritic smelting may be considered forms of the bessemer method of smelting.

New smelting processes are of great variety, and are constantly cropping up in considerable number. Most of the new processes are patented, and in theory many are of a revolutionary nature. Unfortunately such processes have a bad habit of working out wrong in actual practice, though frequently successful in theory. The working out of a new theory of smelting, by laboratory experiments, is a vastly different thing from applying such new processes successfully in works handling immense quantities of material. A small mine or a new mine cannot afford to experiment with new and untried processes of reduction. That work should be left to the big smelters, which, with very few exceptions, are managed by experienced

ual progressive men, who are ready, at all times, to try out new smelting processes that give promise of resulting successfully. The progress of metallurgy is accomplished, as a rule, by small and frequent advances, rather than by great leaps or by revolutionary inventions.

In treating sulphide copper ores, which predominate in most districts, it is necessary to expel the sulphur, and iron also, where that is connected with the copper, as in most cases. The iron can be slagged by the addition of appropriate fluxes, and, where the ores are deficient in iron, that element must be provided by ferruginous flux, iron being necessary in the formation of free slags in copper smelting. As most of the sulphide ores possess an excess of sulphur, it was customary, until quite recently, to drive off the excess of sulphur by roasting before smelting. This work is done still, at many smelters, while at other works roasting has given way to pyritic smelting, or semi-pyritic smelting, as hereinafter described. Excess of sulphur may be removed from ore by heap-roasting in open air, by roasting in shaft furnaces or kiln furnaces, or by calcining in reverberatory furnaces, usually of a special pattern, with rabbles.

The process of heap-roasting is inherently defective, and seems doomed to gradual extinction, semi-pyritic smelting, commonly known as raw sulphide smelting, being preferable, in most cases. While the theory of heap-roasting is the same in all cases, there are many minor modifications. At the Rio Tinto mine, where heap-roasting has been discarded, the heaps were of enormous size, and were burned with a marvelously small amount of carbonaceous fuel. Under the former practice at this mine, hand-selected rich ores, averaging 8 to 10 per cent. in copper tenor, were piled into heaps of about 400 tons each, and fired with a single cord of wood, burning six to nine months each. At the Tyee mine, in British Columbia, the process of heap-roasting has been carried pretty closely to perfection. Ores are dumped from the railroad hopper-cars into sixteen 100-ton receiving bins, with hopper-bottoms and screen-tops, latter set at angle of 40°, all fines under three-eighths inch mesh falling into separate compartments built in the center of each bin. The level of the roast-yard is about eight feet below the tram-tracks that run under the receiving bins. The yard has six permanent trestles, sixty feet apart from center to center, and at right angles to the permanent trestles are six trenches, each four feet deep and forty feet from center to center. Between the permanent trestles are movable bridges, traveling on wheels, these being trussed so as to clear the roast-heaps below. Both permanent trestles and movable bridges have tram-tracks, with turntables, over which travel side-dumping ore-cars, which thus obtain easy access to every square foot of the roast-yard. Roast-heaps are built up automatically, by dumping the tram-cars, each heap averaging twenty-four by fifty feet in size on the bottom, by seven feet in height, and containing an average of 300 tons. Each roast-heap requires an average of eight cords of wood, and burns about three weeks, reducing the sulphur contents to about 5 per cent. The system works perfectly, cintering being reduced to a minimum. When roasted, ore is shoveled into 4,500-pound ore-cars, traveling on tram-lines laid in the bottom of the trenches before mentioned, the tops of the cars being on a level with the bottoms of the roast-heaps. Roasted ore is trammed to the burnt-ore bins, 1,500 feet distant and just behind the blast-furnace build-

ing, there being eighteen fifty-ton bins, with central bottom-discharge gates, emptying into tram-cars running over scales to the charging-floor of the furnace.

In the case of ordinary heap-roasting, where it is not practicable to go to the expense of providing a system so well devised as at the Tyee, ground should be selected with sufficient slope to provide good drainage, and ditches should be dug to carry off rainwater, and also to divert the drainage of adjacent ground, as a large proportion of the metallic values contained originally may be leached out by water in a short time. Usually the ground is surfaced by broken rock or slag, and given a final top-dressing of clay, well rolled or pounded. Above this should be placed a layer of fines, three to six inches deep, to prevent baking the clay, followed by its inclusion with the roasted ore when the latter is removed. On this surface of fines the roast-heap proper is built. There is a first layer of wood, much or little according to the nature of the ores, and usually more than really is needed. The worst wood available will do very well, if care is taken to furnish a little good wood for kindling the fire. Channels are provided, so that after the wood has burned out there is draught through the heap. Chimneys of boards are built at various points, the number of channels and chimneys depending on the size of the heap. In American practice a cord of wood is used for an average of 30 to 50 tons of ore, the percentage of fuel growing less as the size of the heap is increased. The first layer of ore is in coarse lumps, two to six inches in size, or even larger, surmounted by a layer of ragging, or medium-sized lumps, and topped with a layer of fines. The greater the percentage of sulphur, the lower the height of the pile. The shape of the heap on the ground may be square or oblong, usually the latter, to facilitate upbuilding and removal. In a roast-yard it is necessary to have a considerable number of heaps, so that the process may be continuous. The heap is fired, after building, and the wood gradually ignites the sulphur in the ore, which continues to burn for many weeks. The success or failure of the process depends mainly upon careful handling, the heap requiring a small but steady supply of air, for even roasting, while too much air allowed to enter the heap will result in matting part of the ore. Heap-roasting requires much hand-labor, and has various objectional features tending to restrict its use.

Matte is sometimes heap-roasted, requiring several successive burnings, but the practice is of very doubtful utility.

The fuels used in smelting copper are of a great variety, choice depending largely upon availability and prices, as well as upon individual requirements. Bituminous coal is used extensively, and anthracite coal sparingly. Anthracite is a very good fuel, but unobtainable at reasonable prices in most copper fields, while bituminous coal is the most objectionable fuel, and, next to charcoal, the least used, though there is a great difference in the varieties of bituminous coal, some of which work well in partial or complete fuel charges, while others give most unsatisfactory results. Coke, which is the most common fuel, was utilized first at Freiberg, in 1818, and proved an immediate success. For satisfactory work, in either reverberatory or blast furnaces, coke should develop not less than 10,000 British thermal units. Wood is used extensively in Chile, and in

some other districts. Charcoal sometimes is employed in blast furnaces, but for this use should not be burned dead in the kilns or pits, as in such use combustion is too rapid in the furnace, leaving a frozen charge. Where wood or charcoal must be burned for fuel, on account of local conditions, wood-burning reverberatories are preferable, as a rule. Petroleum sprayed into the firebox has been utilized in reverberatory furnaces, and in Transcaucasia is the principal fuel, giving thoroughly satisfactory results. Apparently petroleum is not well adapted to blast-furnaces, as experiments along that line have not proven successful. Gas is used to a limited extent in reverberatory furnaces, giving satisfactory results.

The nature of the charge placed in a furnace depends, necessarily, first upon the ores available, and secondly upon the nature of the principal ore or ores to be smelted. Some ores are so constituted as to be self-fluxing, containing in themselves the necessary iron, silica and limestone. In most cases it is desirable to blend the various copper ores, where the required grades can be secured, rather than to add barren fluxes, but this process depends largely upon the availability of the ores desired. One of the principal reasons for the success of big custom smelters lies in their ability to mix varying ores, from different districts, so as to lessen or entirely obviate the use of barren limestone, silica or iron ore, for fluxing. The use of "sweeteners" is to be commended, where such ores are obtainable at reasonable prices. Ores that are excessively silicious require fluxing with ferruginous copper ores, or with iron ores that are barren of copper, and vice versa. Local conditions regulate practice, and the soundest theories must step aside, at times, in the presence of prohibitory freight rates, which, unfortunately, seem entirely too common, in many of the important copper districts of the world.

In the use of silicious fluxes it should be borne in mind that all silicates are not SiO_2, which is pure silica. Quartzite or some other form of SiO_2 is much preferable to bisilicates or trisilicates, and, of course, the best silicious flux of all is a low grade ore, with gangue composed mainly of SiO_2 carrying appreciable values in gold, silver or copper, or some combination of these three metals. Barium sulphate is difficult of reduction, and ores having a heavy barite gangue are refractory in smelting. Excellent results have been secured at the Ladysmith smelter on burnt ore averaging 38.87 per cent. barium sulphate, a general average analysis of slags from this heavy barite ore giving only 0.37 per cent. copper.

In the case of native copper from the Lake Superior mines, which reaches the smelter with only 20 to 50 per cent. gangue rock adhering, the process of reduction is simple. Oxide and carbonate ores are smelted readily, but with sulphide ores it is necessary to utilize different methods as hereinafter explained. Pyritic and semi-pyritic smelting are employed successfully in some works treating sulphide ores, but the usual process of reduction calls for preliminary roasting, in yards, or, more frequently, calcination in reverberatory furnaces, before charging for smelting. A full treatment of sulphide ores is given later, in this chapter.

Fines, coming either as fine concentrates, slimes or flue-dust, cannot be smelted in reverberatories, on account of the heavy draft of the furnace blowing out large quantities of the fines as flue-dust, but can be smelted with fair success in blast-furnaces by briquetting [illegible]

ing. The briquettes made from slimes frequently include flue-dust, and are charged while moist, or the briquettes may have lime or other material for a binder, if necessary. Fines charged directly into blast-furnaces cause the growth of crusts on the sides of the furnace, together with the formation of excessive quantities of flue-dust, thus reducing the output both through losses in fumes and reduced capacity of smelting. Cement copper is a reddish precipitate, composed of metallic copper and sundry impurities, requiring smelting and refining before use. Copper bottoms are alloys of metallic copper and metals existing in the matte as impurities, formed in matting.

Ore bedding is a system by which ores of various grades are stocked near the furnace, and used as required, for mixed charges. In using this system concrete or stone-lined pits, shallow and narrow, but long, are built beside railroad tracks, and ore is dumped into them from railroad cars coming from the mine. Different grades and varieties of ore are kept in different pits, and these, as needed, are scooped up by a steam-shovel and loaded into cars for carrying to the furnaces. The system is suitable only for large works that can afford a steam-shovel, and the value of the method is dependent largely upon the thoroughness with which the plan is carried out.

Mechanical charging is preferable to hand charging in all but small works, and is in very general use. For blast-furnaces, charging is best done by means of side-dumping cars. For reverberatory furnaces the best method of charging is through hoppers in the roof, near the firebox end, and, in the case of the larger reverberatory furnaces, the process is semi-continuous. In Lake Superior smelting with reverberatories the mineral is loaded into one or two-ton side-dumping tram-cars having V-shape bottoms. These are loaded transversely on railroad flat-cars, and are unloaded onto trestles leading into the smelters, the dump-cars being discharged either into bins, for storage, or direct into the hoppers above the reverberatories.

Furnaces for copper smelting are of two classes, the first being the blast-furnace, which has a powerfully reducing atmosphere, and the second being the reverberatory furnace, where the reflected flame gives a neutral atmosphere. The comparative availability of these two classes of furnaces depends largely upon local conditions, and in many plants both forms are found. The choice of kinds of furnace should be based upon a careful consideration of all the circumstances of each individual case. There is no large difference in cost of equipment between blast and reverberatory furnaces, though as a rule the latter are somewhat more costly. Blast-furnaces and their adjuncts occupy only about half the space required for reverberatories. Blast-furnace slags usually run a little higher in copper than reverberatory slags, under similar conditions, but there is a considerable variance according to the circumstances of each case. Reverberatories make very much less flue-dust, as they lack the blast that is such a powerful agent in carrying off fine particles of solid matter in the gases from blast-furnaces. Reverberatories require only about 50 per cent. of the power of blast furnaces, and a slightly smaller force of workmen for an equal capacity.

The blast-furnace was the earliest smelter of any sort, and its age is

greater than that of history itself. Crude forms of the blast-furnace are found in use still, in remote portions of Mexico, South America, the Philippines, China and elsewhere. In the original form the blast was supplied through hollow tubes from human lungs. In fact, iron is made, to this day, in remote oases of the Sahara desert, with the aid of human blast. The next step was the invention of a crude bellows, and to supply continuous blast, two bellowses were used, worked alternately, the blacksmith's forge of today being merely a slightly improved form of the blast-furnace of prehistoric times. In its crudest form the blast-furnace is an open pit, or shallow depression in the ground. The next step is a small oven of stone, into which ore and fuel are charged. The development of the blast-furnace, to its present size and efficiency, has been accomplished by a steady succession of little improvements, covering many centuries, rather than by single strides, yet it may be said, with safety, that blast-furnace smelting has been improved more in the three past decades than in the five preceding centuries. Increase in the number of tuyeres was begun at Freiberg in 1845. The movable forehearth, now in general use, is an American invention, of comparatively recent date. The growth of the blast-furnace in capacity has been marvelous during the past few years. In 1900, the closing year of the Nineteenth Century, the largest blast-furnace in existence had a daily capacity of about 300 tons only, yet in 1907 the largest blast-furnace in use, at the Washoe works, Montana, had a length of 86 feet and a daily capacity of 2,700 tons. This single furnace, running on 6 per cent. ore, which probably was about the average of copper ore smelted at the beginning of the Nineteenth Century, could have turned out, in less than 60 days, all of the copper produced in the world in one year, one hundred years ago. The big blast-furnace at the Washoe works, made by cutting out the end-plates and joining a number of contiguous cupolas into a single furnace, has resulted in a very considerable decrease in fuel consumption per ton of ore treated.

The date of invention of the water-jacket blast-furnace remains a subject of dispute. A ten-ton blast furnace of two feet diameter, built by Wendt, in 1876, was given a water-jacket. Two years previously, in 1874, a water-jacket was installed at the Longfellow mine, in Arizona, which was 800 miles from a railroad, at that time, with fire-brick costing one dollar each and of short life, the ore being highly basic. J. B. Cooper states that the first water-jacket blast-furnace was used at the Detroit smelting works previous to 1864. While blast-furnaces are used occasionally with fire-brick linings, water-jacketed cupolas are employed almost universally. Despite the considerable loss of heat resulting from the circulation of water between the inner and outer shells, the water-jacket has proven itself both efficient and economical. Furnaces usually are rectangular, though occasionally circular or oval, with jackets of soft steel, wrought-iron or even cast-iron, and occasionally of copper.

The smelting of copper ore in a blast-furnace is a process of reducing the metal from its ores by the use of carbonaceous fuel, usually coke, in a cupola having a blast of air, which may be drawn direct from the atmosphere, or heated before passing into the furnace through the tuyeres. Blast-furnace smelting is adapted to the reduction of almost all of the commercial ores of copper, though for certain specific uses reverberatory

furnaces are to be preferred. Fuel and flux, in the quantities demanded for reduction and slagging, are added to the ore, the flux being barren, or containing metallic values, as circumstances may dictate.

Preheated air for the blast was used first by J. B. Neilson, in 1828, at an iron furnace, and was used first on copper at Freiberg, in 1837, but did not prove fully successful there, though utilized permanently at Kongsberg, where it was installed shortly afterward. The rotary Roots blower was the first in American use, and remains the principal producer of slightly compressed air for blast-furnaces. The pressure under which blast is furnished depends mainly upon the depth of the bath, it being evident that increased pressure is required to force air through an increased depth of molten matter, the average pressure being 14 to 16 ounces per square inch. Blast is heated to greatly varying temperatures, ranging up to 800° Fahrenheit at some works, and the heating may be done in several ways, the most economical method being the heating of the blast by waste gases from the furnace itself.

The date of invention of reverberatory furnaces seems uncertain. The earliest British record of furnaces of reverberatory type is dated 1765. Furnaces of this class can be made, at a pinch, of adobes or sun-dried brick, and these, while crude, and not recommended for use where better material can be had, give fairly satisfactory results in the hands of a first-class smelterman. In the reverberatory furnace the flames from a lower grate, on which the fuel is burned, are reflected back upon the ore, lying on a bed above, thus giving a neutral atmosphere. The forehearth is brick-lined, and movable, and the air entering the furnace may be preheated, though this is not customary. In the best average practice five to seven tons of ore are smelted per ton of fuel burned, the larger furnaces giving the lower ratios of fuel consumption. In the case of sulphide ores the reverberatory furnace produces a richer matte than from the same ores reduced in a blast-furnace.

During the past thirty years the reverberatory furnace has gained tremendously in size. In 1878 the capacity of the average American reverberatory was 12 tons only, but had increased to 24 tons in 1887, and, in the case of the larger furnaces, had increased to 50 tons in 1894, 150 tons in 1899, and 300 tons in 1902. The largest reverberatory furnace in existence is at the Washoe works of the Anaconda mines, in Montana, this being 19 feet wide and 116 feet long, with a daily average capacity of about 300 tons.

In the Lake Superior district the smelting of copper mineral is done in reverberatories. The charge is first melted down, with fuel and flux, anthracite coal and coke constituting the fuel and limestone the flux. The products of the first fusion are slags rich in copper, which are resmelted, and impure copper, which is tapped to a refining furnace, where rabbled by blowing air through a gas-pipe, this process having an oxidizing effect on the charge. The copper is then poled with staddles of green wood, to bring it to the proper pitch, when it is dipped and moulded by hand, or tapped into mechanical casting machines. It is possible to perform the entire operation of fusion and refining in the refining furnace alone, but in practice it is found profitable to separate the work into the two operations previously noted. The standard Lake Superior reverberatory furnace is 13x17 feet and the largest in the district, previous to the building of the Michigan smelter,

was 17x28 feet. At the Michigan works a furnace 20x50 feet was built, but, after repeated trials, this was found too large to hold the heavy charges of mineral, and was cut down to 16x35 feet in size, and furnished with a 24-inch ventilated bottom.

The bulk of the world's copper supply comes from sulphide ores, and, while leaching processes are used to a considerable extent, the far greater part of the sulphide ores is reduced by heat alone. Unless pyritic or semi-pyritic smelting be employed it is desirable that as much as possible of the sulphur be eliminated before the ore goes to the smelter. Preliminary roasting or calcining may be done in the open air, by heap-roasting, as previously described, or by roasting in stall, shaft, or kiln furnaces. The roasting of sulphide ores may be reducing or merely oxidizing in nature. The calcination of copper ores is a simple process, in theory, but in practice requires nice discrimination and care, to secure the best results, owing to the varying proportions of copper, iron, sulphur and other elements found in the raw ores. The skill with which the calcining is done greatly affects the success and cost of the future processes of reduction. As the combinations of ore vary greatly in different districts, the practice also varies to a considerable extent, and the best practice for the calcination of a given ore is determined, first by theory, and secondly by actual work.

Calcining may be done in hand-furnaces, but automatic devices are more economical, and are in general use in all but the smallest and least modern works. Hand reverberatory furnaces, with the hearth heated by a fireplace separated from the furnace by a bridge-wall with side openings, give as good satisfaction as can be secured with hand furnaces. Muffle furnaces are used occasionally, though not extensively, giving a very equable heat, but proving expensive in operation. Hand power cylinders are used at times, but are not so economical as mechanically operated calciners. The Brückner automatic intermittent discharge cylinder, invented 1864, has a greater diameter and shorter length than other varieties of cylindrical calciners, hence it takes less floor space, and is automatic and efficient in operation, being in quite general use. The Douglas muffle cylinder calciner, with continuous discharge, has a central flue of tile, which takes combustion products direct to the chimney. This calciner, while suitable for general work, is especially adapted to the economical and cleanly saving of sulphur fumes for the making of acid.

The principal form of calciner is the automatic reverberatory, of which there are a number of varieties, mainly patented, all of more or less value. These consist essentially of stationary reverberatory furnaces, through which plows are dragged, to rabble the ore under calcination and to remove the calcined ore. One of the most efficient forms is the turret furnace in which horizontal revolving plows are actuated from a central shaft, the ore charge being fed automatically from hoppers above. The turret furnace is economical of floor space and attendance, and may be built with a number of decks. The four-hearth Welsh calciner has hearths of 16x16 feet. The O'Hara calciner, with straight hearth, was the first to use mechanical rabbling, with plows set on horizontal arms attached to an endless chain. The turret calciner of Pearce, with superimposed hearths, came out in 1892. The McDougall mechanical calciner, invented 1891, is the type found in most general use. This has numerous superimposed hearths, some furnaces having

as many as six, each rabbled by rotating arms carrying plows. The Argall furnace has a hearth with reciprocating movement, rabbles being lifted automatically when the hearth makes the return movement.

Ores are roasted also in kilns, stalls and shaft furnaces. A stall furnace is merely a perfected form of heap-roasting, wherein brick, stone or slag-block walls are built about the roast-heaps, giving perfect regulation of air currents. Where necessary a roof is built, to prevent the access of rainwater, which would leach out a considerable part of the copper values. In the most modern forms of stall furnaces, paved or grated floors are added, and stalls grade into furnaces by the addition of flues and chimneys for the carrying off of roast-gases. The Gerstenhöfer shaft furnace, utilizing the sulphurous fumes for making sulphuric acid, consists of a vertical shaft with a mechanical device for feeding the charge from above, and the fresh pulverized ore is intercepted in its downward progress by projecting ledges, permitting its partial oxidation. Kiln roasting also is employed where sulphurous fumes are saved for making acid, the kilns being of shaft-like form. The advantage of kilns and shafts is found mainly in the saving of the sulphurous fumes, but the process of desulphurization is more complete than is possible in heap-roasting or stall roasting.

Matting is the process of making a semi-metallic compound from sulphide ore, materially richer in copper than the ore treated. In the process of matting a considerable proportion of the sulphur in the ore is thrown off in fumes, and a large part of the original gangue is eliminated as slag. A definition of matte, or regulus, as it sometimes is called, is exceedingly difficult to give, for the reason that matte may contain greatly varying proportions of any of its elements, and a considerable variety of elements, of which sulphur always is necessary, copper being necessary, of course, in a copper matte, and lead in a lead matte, while iron, arsenic and a number of other impurities, some valuable and others damaging, are found in greater or less number and proportions in different mattes. Copper matte may contain as little as 15 per cent, or as much as 75 per cent. of the metal, though usually rainging from 25 or 30 per cent., in the lower grades, up to 50 or 55 per cent. in the higher grades. Copper matte is an intermediate product between raw or calcined ore, usually the latter, and the finished copper product. Matte is variously considered as an alloy, a mechanical compound or a mechanical mixture. It obviously is a semi-metallic product, possessing certain metallic characteristics, such as malleability, which is quite marked in the case of some high grade mattes. The mattes of high grade have specific names, according to their copper tenor. Blue metal is a matte containing 60 to 65 per cent. copper; white metal runs 70 to 75 per cent. copper; pimple metal carries 80 to 85 per cent. copper. Black copper is impure metallic copper carrying 1 to 5 per cent. sulphur, also sundry metals and metalloids, the name coming from the oxidation of the surface to a dull black. Blister copper is the highest grade of unrefined metal, carrying 96 to 99.5 per cent. copper, with one per cent. or less of sulphur, and small, variable quantities of other impurities. Its name comes from the blebs or vesicles, in which the bubbles of gas, from sulphur and other volatile elements, are retained as the copper hardens. Blister copper looks well, and is suitable for many uses, but, with the exception of the unusually pure metal from Lake Superior mines, blister copper is red-short, as a rule, though

and cold-short in most cases. The quality of blister copper varies greatly, the purer brands being of good commercial grade, while the baser qualities are suitable for rough copper uses only.

The tendency of present practice is away from the old plan of blowing up a matte to blister copper by easy stages, and in the most modern plants only two fusions are required between calcining and bessemerizing. The separation of matte from the slag depends mainly upon specific gravity, hence the separation is imperfect when heavy basic ferruginous slags are produced, while light silicious slags usually are quite free from matte. Copper bottoms are alloys of metallic copper and other metals existing in the matte as impurities. The formation of the bottoms purifies the matte, and such bottoms are resmelted. In matting it is found that small furnaces are exceptionally liable to freeze. The product of the first fusion in the reverberatory matting process is of low grade, ranging from 15 to 50 per cent., usually 25 to 40 per cent., in copper tenor. If the charge is blown up to more than 50 per cent. copper at the first fusion, the slags are almost certain to carry considerable copper, entailing direct losses, or necessitating resmelting.

Blast-furnace slags, as a rule, run a little higher in copper than reverberatory slags produced from the same ore. The chemical composition and physical properties of slag vary according to the nature of the ore and fluxes, but usually slags are rich in both iron and silica. In Lake Superior smelting practice the reverberatory slags run 10 to 25 per cent. in copper tenor, and are resmelted in blast-furnaces, which, in turn, give slags carrying only 0.5 to 1 per cent. copper. An average of 10 per cent. copper in reverberatory slags is considered good practice in the Lake Superior district, the nature of the material treated differing greatly from the ores of other districts. The rich slag, containing much cuprous oxide, is skimmed off at the end of poling.

The scoria, or slag from a smelter, accumulates in large quantities, and its disposal sometimes becomes a matter of difficulty. Various systems are in use for disposing of slag, the simplest being to let it run outside and care for itself, but this is possible only where there is a sharp incline and plenty of room, conditions frequently lacking about a modern smelter. Where it is impossible to permit the slag to care for itself, the cheapest method of disposal usually is by granulation, which is accomplished by running the molten slag into a trough conveying a small stream of rapidly running water. The slag granulates instantly, and is washed away by the water and deposited by gravity at any point desired, granulated slag being sluiced in water almost as easily as coarse sand. Slag may be disposed of also by removal from the furnace in slag-pots, transported by hand, horse or mechanical power, or may be run out in gutters, while liquid, though somewhat difficult of handling by this method because of its viscosity. At a number of smelters slag-bricks are made, and while these are not suitable for general building purposes, they are available, to a considerable extent, about a modern reduction plant, and make satisfactory brick for almost any rough use.

In calcining or smelting copper ores, varying proportions of the metal are volatilized and carried off with the roast-gases, while fine particles of unmelted ore may be carried out of the smelting zone by the powerful draft of a blast-furnace. Formerly the copper blown out in fine particles, and

volatilized by intense heat, was lost, but in all modern plants the greater part of such furnace loss is regained by deposition in dust chambers. It has been found advantageous to make the dust chambers of great length, which permits the settling of the small solid particles from the fumes, and the sublimation of the volatilized copper along the course of the flue. Dust chambers are found in all modern plants, and as a rule are merely enlargements of the flue, having transverse partitions permitting the gradual settling of the dust from the furnace fumes. In the larger plants the flue-dust is removed from the dust chambers through hoppers underneath, which load into tram-cars. As flue-dust usually is high in arsenic and antimony, volatile elements that are highly deleterious to finished copper, flue-dust commonly is smelted by itself, though sometimes mixed with matte or briquetted with fines previous to resmelting.

Fumes from sulphide ores are injurious to vegetation, and lead to much litigation. There is no question that much damage is caused to agricultural interests by smelter fumes, and equally there is no question that an industry of mulcting smelters has grown up among agriculturists in various smelting districts. The courts usually hold with the farmers, and increasing trouble is caused the smelters, with prospects of still more serious trouble in the future. It has been suggested that smelter fumes be concentrated and turned into the streams, but this suggestion is not practicable, as the damage would be far greater than now caused by dissipating the fumes in the air. The sulphur fumes from roast-heaps are especially objectionable, as they lie low on the ground, doing far more damage than the fumes thrown off from high stacks. Owing to the increasing difficulties of smelters with surrounding agriculturial interests, because of noxious fumes, it is certain that the sulphur contents must be used, to an increasing extent, in the manufacture of acid.

One ton of sulphur combined with oxygen and water makes three tons of sulphuric acid, which is the basis of all other inorganic acids, and may be called the foundation of commercial chemistry, as there is scarcely a single branch of chemical manufacture that does not depend, directly or indirectly, upon sulphuric acid. Previous to 1838 the volcanos of Sicily were practically the sole producers of sulphur for the making of acid, but owing to a short-sighted attempt at unduly raising prices, the cost of sulphur was made almost prohibitive, leading to the utilization of the sulphur contained in iron pyrites, more especially the cupriferous pyrites of Cornwall, Wales, Ireland, Portugal and Spain, incidently having a strong influence in reopening the principal copper mines of the Iberian Peninsula, which are notably rich in sulphur. Sulphuric acid can be manufactured easily by passing sulphurous acid fumes, given off from sulphide ores roasted in shaft-furnaces or kiln-furnaces, through lead-lined acid chambers, where the fumes are taken into solution by water. The contact acid process, a comparatively new invention, is available for making sulphuric acid from fumes containing only a small percentage of sulphur dioxide. The United States lags behind Great Britain and Germany in this detail of the copper industry, and, as has been pointed out by Prof. Douglas, the United States, while leading the world in some branches of metallurgical practice, is by no means well to the front in the fullest possible utilization of by-products.

The process of conversion, or bessemerizing, now in very general use in

copper smelters treating sulphide ores, which reduces high grade matte to blister copper, dates, in its inception, from 1855, when the first patent for making steel from iron by his new process was taken out in England by Sir Henry Bessemer. The first attempt at utilizing the Bessemer process for the conversion of copper was made at the Bogoslovsk mine, in the Ural Mountains of Russia, by Seminikov, who did not succeed, however, in producing metallic copper. In 1880 Pierre Manhes begun experiments at Verdennes, near Arignon, France, and the process of bessemerizing, as applied to copper, was brought to a commercial basis by Manhes, though somewhat improved by Paul David in 1881. The first successful converters made by Manhes, at Lyons, France, took 3-ton charges. The process was brought into the United States in 1883, by Franklin Farrell, who installed a Manhes plant for conversion at the Parrot mine, in Butte, Montana, considerable improvements in the practice being made at the Parrot plant. Since then the process has enjoyed great growth, having come into practically universal use for the final smelting of sulphide ores.

The first converters utilizing the Bessemer process were very small in size, treating only 2,000 to 3,500 pounds of matte at a charge, and were rotated by hand, the operation requiring two stages. Converters now in use run 12 to 15 tons in size, as a rule, though the Washoe plant of the Anaconda has trough converters 96 x 150 inches in size, and the largest converter ever built is at Butte, Montana, being of the tremendous and somewhat unwieldy size of 8x20 feet. The weight of charge in a converter varies greatly, the first charge in a newly lined shell being much smaller than the last, owing to gradual destruction of the lining.

Bessemer converter plants vary greatly in size, at different works, but the essential plan is the same in all cases. A single unit consists of a stand, one or more movable shells, and an air-compressor to furnish blast. As a rule there are about two shells for each stand, as shells must be newly lined from time to time. The stands, built of steel, hold the shells containing the charge, which are mounted on trunnions, and the stand is provided with devices for tilting the shell. Hand power for tilting is used at some of the smaller installations, but in all larger plants mechanical power is employed, rotation usually being accomplished by electric or hydraulic power. A blast of varying strength, averaging about 15 pounds per square inch, is furnished by an air-compressor connecting with the shells through ball valves, which have replaced the old style plugs. The number and size of the tuyeres through which the blast enters the retort vary according to the style and size of the converter.

The retorts, or shells, are made of boiler-plate steel, in three principal charges which are strongly bolted together. Shells are of widely varying sizes and types, the principal styles being the barrel type and the pear-shaped round type. The barrel type being easier to handle, both on and off the stands, is in most general use. The shells are lined, sometimes with brick, though this is going out of style, the usual lining being a refractory material thoroughly tamped in and dried. The most common lining material is made of quartz and clay, the latter serving merely as a binder. In many cases it is advisable to use silicious low grade ores for lining, owing to their mineral values, but such linings rarely give us good results as do those of pure silica. Magnesite linings have been used with success at some plants, and are said to have given unusually long service. The lining [illegible]

age life seems to be that made from quartzite containing about 85 per cent silica and 10 to 12 per cent. alumina, bonded with clay. The life of linings varies greatly according to different factors, high grade matte containing little iron being least destructible to linings. The usual lining consist of practically pure quartz, or gannister, containing 98 to 99 per cent. silica, bonded with a little clay. The quartz or other silicious material usually is crushed in rolls to pass a ⅝-inch trommel, or may be crushed in a Chilean mill or grinding pan. Quartz and clay are dumped into large bins, in the lining department of a smelter, and are withdrawn and mixed as necessary in a mixing pan, or trough. The lining is done in sections, the lower section being tamped with a mixture of about one part clay to five or six parts of quartz, mixed rather dry, while the upper portion is lined with a softer mixture. The lining is tamped in, sometimes by hand, but mainly mechanically, with heated bars, and the linings, when completed, vary in thickness from about 30 inches, at the tuyeres, to extinction at the mouth of the shell.

In the actual process of conversion at the best arranged plants the high grade matte is run direct from the cupola well of the furnace into the converter shells. Blast is turned on automatically, by rotating the filled shell to its normal upright position, and the powerful blast, working its way upwards through the molten matte, causes the sulphur to unite with the oxygen in the air and pass off as sulphur dioxide. The converter blows off, with a tremendous roar, into a hood that connects with a flue running to the dust chamber. More or less copper is volatilized by the powerful blast, but nearly all of the metal so driven off is saved in the dust chambers, and resmelted at flue-dust. The blowing of a converter charge is a delicate process, and considerable experience and care are required to secure the best results. If the charge is overblown the slag becomes high in copper oxide, while if underblown the process of conversion is not carried out fully, and the resulting blister copper will contain an undue percentage of impurities. Owing to the greater specific gravity of gold and silver, the precious metals tend toward the bottom of the converter, and can be saved therefrom to a considerable extent, if desired, but as practically all bessemerized copper now is refined electrolytically, and gold and silver values are recovered much more perfectly by electrolysis than by any possible method of metallic segregation, the separation of gold and silver in the process of conversion is now attempted at but few smelters.

The ferric oxide formed during the combustion of the matte robs the converter linings of silica to form slag, and the life of the lining is long or short in proportion to the slow or rapid destruction of its silicious material through uniting with little or much iron in the matte to form slag. In average practice linings last for six to eight blows, though in some instances the life is much longer, and occasionally considerably shorter. The iron in the matte is eliminated before the sulphur, the oxidation of the sulphur contained in the charge being the final process. Zinc is oxidized from the matte to a considerable extent, while arsenic is eliminated but slowly in the earlier stages, and antimony remains practically intact in the matte until the final process, when it is largely eliminated in the last few minutes of blowing. The copper oxide in the matte is reduced by the copper sulphide, the sulphur becoming oxidized and passing off in fumes, while the metallic copper, as formed, sinks to the bottom of the shell. The flames

from the mouth of the shell change in color, at different stages, and are watched closely by an experienced man in charge of the process. At the start lambent greenish flames, mingled with yellow, are noted playing over the surface of the charge. At the period of skimming the slag, which is when the matte has reached the white metal stage, with a tenor of about 75 per cent. copper, blue flames are noted. When blue flames become prominent the blast must be shut off, or foaming and explosion are almost certain to be caused by violent chemical reactions that produce large volumes of sulphurous anhydride. In the best practice ten to fifteen ton converters handle full average charges, and turn out finished blister copper of better than 99 per cent. tenor, in 45 to 75 minutes. The blister copper produced must be refined electrolytically, in nearly all cases, to eliminate a considerable variety of impurities, present in the metal to only a limited extent, but highly deleterious to finished copper.

In order to prolong the life of the linings, pulverized silicious material sometimes is blown into the charge through the mouth, or placed in the bottom of the shell before charging with matte, such material furnishing a portion of the silica required for slagging the iron, and thus prolonging the life of the lining. Such pulverized material should be thoroughly dried before charging, as it may cause serious explosions if even slightly wet, when coming into contact with the molten matte.

At the British Columbia smelter, in 1906, it became necessary, while rebuilding the plant, to convert cold matte in the shells. This was accomplished by lighting a wood fire, which, when thoroughly ablaze, was covered by a charge of 1,500 pounds of coke, and a light blast turned on. When the coke reached red heat, three tons of cold broken matte were added, and full air pressure turned on. The matte melted quickly, and further broken matte was added. The slag was partially skimmed, and further matte added from time to time, until the shell was fully charged. The entire process required 3½ hours only, and 15 tons of 40 to 50 per cent. matte were converted, in one stand, in a single shift. Matte up to 55 per cent. in copper tenor was converted, but was found more liable to freezing than matte of lower tenor. The process was not economical, though necessary under peculiar circumstances, but demonstrated latent possibilities.

The casting of copper, after the final process of smelting or converting, may be done by hand or machine. In hand work the copper must be dipped in ladles and cast into moulds by hand labor. The machines are made of two types, one having an endless chain, with automatic tripping of ingots into water for cooling, the second type being the Walker casting machine, in which moulds are carried on a circular platform, copper being cast through a tapping-ladle direct into moulds. Some cuprous oxide is sure to be formed in casting. Copper shrinks in casting 0.1[illegible] per foot, or 1.56 per cent., as compared with 1.32 per cent. for brass, 2.6 per cent. for zinc and lead, 1.69 per cent. for aluminum and 1.[illegible] per cent. for iron. Eutectic copper is a mutual mixture which [illegible] last in casting, after ingredients in excess have been removed [illegible] cooling. Eutectic copper is a mixture of metal with about [illegible] of cuprous oxide, containing about 0.38 per cent. oxygen. [illegible] mosaic eutectic copper can be seen as a thin ground [illegible] grains of pure copper. Eutectic copper is transparent [illegible] reflected light and is red in transmitted light. Eutectic [illegible]

source of weakness in castings requiring tensile strength, especially in copper tubes that carry hot and reducing gases, which may react on the eutectic copper in the tubes, with the result of forming fine cracks.

The principal features of general copper refining, including impurities, are treated in the following chapter on the electrometallurgy of copper, as it seems desirable to cover the subject in one chapter, rather than in two, and the bulk of the world's copper production now is refined electrolytically.

In the middle of the Nineteenth Century refining furnaces for the refining and casting of blister copper were about 5x10 feet in size, taking average charges of seven to ten tons. The average size now is about 18x30 feet, with average charges of seventy-five tons. The oxidation of impurities contained in the copper can be accelarated by means of an air blast playing upon the surface of the molten metal. The "direct method" of copper refining consists essentially of the fusion of a mixture of raw and calcined matte, of about white metal grade, the resultant product being blister copper.

Pyritic smelting practically was invented by John Hollway, in 1878, though he did not succeed in bringing the process to do satisfactory work. The experiments of Hollway were made in an endeavor to smelt Rio Tinto copper sulphides by heat generated through the oxidation of their sulphur. The first attempts along this line in the United States were made, circa 1887, at Toston, Montana, where a partial success was scored. The first absolutely successful pyritic smelting was done by Robert Sticht, at Mount Lyell, Tasmania, in the early years of the present century.

While pyritic smelting is rather closely allied to raw sulphide, or semi-pyritic, smelting, it differs considerably in theory from that process. Full pyritic smelting practically is a bessemerizing process from the start, carried out in blast furnaces, rather than in converters, in its earlier stages. The process consists of the reduction of sulphide ores without the use of other fuel than the sulphur contained in the ore itself, whereas semi-pyritic smelting is the reduction of sulphide ores to matte with extensive use of the fuel values of sulphur contained in the ore, and with a minimum charge of carbonaceous fuel. In theory pyritic smelting is applicable to any raw sulphide ore not carrying lead. The roasting or calcining of sulphide ores drives off, by oxidation, large quantities of sulphur, which undoubtedly is a valuable fuel, providing it can be so burned as to give an oxidizing or reducing atmosphere in a furnace. Sulphide ores occasionally require a small addition of oxidized ores to serve as fluxes.

In theory one pound of pyrite, burned in a furnace, is equal to 2,026 British thermal units, this being about 35 per cent. of the calorific value of a pound of average carbonaceous fuel, but in practice the percentage of value in pyrite probably is considerably smaller. Making all reasonable deductions, one pound of pyrite probably carries fuel values equivalent to 15 to 20 per cent. of the fuel values contained in a pound of coke. The fuel value of a unit of pyrite burned to FeO and $2SO_2$ is calculated by Lewis T. Wright as 1.926, while given by other authorities as only 1.29, this comparing with 8.08 calories secured from the combustion of one unit weight of carbon burning to CO_2. It is probable that Mr. Wright's figures are a very close approximation to the actual calorific value of pyrite.

pyritic smelting apparently are few and simple, in theory, but in actual practice results have been distinctly disappointing in the great majority of cases, hence the great measure of success scored by Mr. Wright and the complete success scored by Mr. Sticht are most notable, as well as most encouraging. That there are serious practical difficulties in the way of successful pyritic smelting cannot be gainsaid, but as these have been overcome fully in one plant, and very largely in another, while marked progress has been made elsewhere, it would seem that the process, which offers benefits that are readily apparent, should come, eventually, into quite general use, though it is improbable that it will be found suited to all sulphide ores.

Semi-pyritic smelting, or raw suphide smelting, is a system by which partial advantage is taken of the sulphur contents of the ore for fuel purposes, but differs from full pyritic smelting in that carbonaceous fuel to a varying extent, is necessary under all circumstances. This process is in quite general and growing use, and has given highly pleasing results where carried out intelligently, but experience and ability are required to secure fully satisfactory practice. The process of semi-pyritic smelting may be said to date from A. D. 1555, when the essential theory was evolved by Barthold Hohler, who first utilized iron pyrites as a carrier for the precious metals. The Kongsberg process of semi-pyritic smelting adds raw pyritic ores to the charge, simply to produce a carrier or matte for the precious metals, and differs widely in theory from the principle of pyritic smelting.

Raw sulphide smelting is done in a blast-furnace, ore being put into the furnace by layer charging or by column charging. In layer charging the raw crushed ore is blended intimately with a small proportion of coke, and the mixture is fed into the top of the furnace, there being gradual heating, followed by the ignition of the entire mass. In column charging the raw crushed ore is fed into the smelting zone of the furnace, and a strong hot-blast aids in the process of reduction, exercising a bessemerizing effect. When carefully handled, a furnace fed by column charging gives matte of good grade, with exceptionally clean slags, and turns out a large tonnage of matte with minimum coke consumption. It has been found that in raw sulphide smelting furnaces of more than four feet in width are apt to run cold, and form crusts. Considerable trouble was experienced at first through the formation of crusts on the sides and corners, necessitating frequent barring, but this trouble can be overcome almost entirely by careful charging.

The proportion of sulphur varies greatly in ores smelted by the semi-pyritic process, ranging from nearly 50 per cent., as in the case of low grade cupriferous pyrites, containing chalcocite or chalcopyrite disseminated in pyrite, to as low as 5 per cent. sulphur in the total charge, in the case of some other sulphide copper ores. Zinc up to about 5 per cent. of the charge is mainly volatilized. Alumina proves injurious, tending to form infusible silicious compounds that bring about the formation of crusts in the furnace, and also gives great trouble in the settlers.

Raw sulphide smelting has been brought to a high degree of success by the Ducktown and Tennessee companies, close neighbors in the southeastern corner of the state of Tennesse. At the Tennessee smelter the first fusion gives a low grade matte of 10 to 15 per cent. copper. This matte is charged,

broken, with silicious flux, the use of limestone having been abandoned, into a second furnace, the product of the second fusion being a matte of 45 to 50 per cent. copper tenor, though, if necessary, a matte carrying up to 60 per cent. copper can be turned out. The second fusion gives an iron slag running up to about one per cent. copper, which requires resmelting. Pyrometric tests, at the works of the Tennessee Copper Co., show that a furnace run on green ore, with a charge of only 2.5 per cent. coke, is hotter in the smelting zone than similar furnaces charged with roasted ore and 12 per cent. of coke, the excess heat produced by raw sulphide smelting ranging up to 100° Centigrade.

The Tennessee company, by changing to raw sulphide smelting, cut fuel charges of coke from 12 per cent. on roasted ore to an average of 3.5 per cent. on raw ore. The Ducktown smelter uses 4.4 per cent. coke charges only, to produce a 50 per cent. matte. This plant was the pioneer in raw sulphide smelting, and the work done there is entitled to great credit. Raw sulphide smelting reduces the output of a furnace by 20 to 30 per cent., but this reduction in output is more than counterbalanced by the elimination of the preliminary roasting processes. Raw sulphide smelting also does away with the extremely noxious sulphur fumes arising from heap-roasting. The fumes and gases from a smelter can be discharged from a high stack, causing minimum damage, while fumes from roast-heaps lie lower on the ground, and cause great injury to all surrounding vegetation. It also is possible to utilize the sulphur dioxide produced in raw sulphide smelting for the manufacture of sulphuric acid by the contact process, and this plan is to be used at the Tennessee smelter.

The raw sulphide smelting process requires 40 to 50 per cent. larger furnace capacity than the old system providing preliminary roasting or calcining, but effects enormous savings in other directions. Raw sulphide smelting requires extra labor, by reason of the double handling of matte, but this is more than balanced by the saving of one extra handling of the ore required by the old process. At the Tennessee works the saving in labor is estimated at 40 cents per ton of ore, or more than one cent per pound on finished copper, and there is an immense saving in fuel, estimated at nearly two cents per pound on finished copper.

Apparently the very considerable utilization of the sulphur contents for fuel use renders the hot-blast unnecessary in reducing strongly pyritic ores. The hot-blast has been dropped at the Mount Lyell, Ducktown and Copper Queen smelters, and never was installed at the Tennessee works, these being four of the most progressive smelting plants in existence.

The reactor process, invented circa 1901, does not seem to have proven the success that was anticipated, and is not found in general use.

Nickel-copper ores are matted quite readily, but the product is difficult of reduction, and requires special processes. The Orford works, which treat a large proportion of the entire output of nickel copper matte, utilize sodium sulphate, which dissolves copper and iron sulphides freely, forming a solution of lower specific gravity than that of the nickel sulphide. The nickel-copper matte is charged with coke and sodium sulphate into a cupola furnace. When fused the sodium sulphate is reduced by the coke to sodium sulphide, and forming a solution with part of the copper and iron sulphides, flows with the undissolved nickel sulphide through the tap-hole into moulds,

where the constituents separate according to their specific gravities, the dissolved copper and iron sulphides floating to the surface. When the mould has solidified the parts are separated by fracture, and the tops, containing copper and iron sulphides, are recharged into a smelting furnace, where the sodium sulphide is fluxed for an iron slag. The bottoms of the moulds, containing nickel sulphide, but with more or less copper and iron sulphides admixed, are resmelted by the same process as before. Formerly four or five successive smeltings were necessary to bring the nickel sulphide to sufficient purity for the refining process, but by a recent improvement a longer smelting period is given, causing more complete dissolution of the copper and iron sulphides, and two treatments are sufficient, in an open-hearth reverberatory furnace, to effect fairly complete separation of the nickel and copper, 50-ton charges requiring four to five hours heating, after complete fusion.

The Mond process of reducing nickel-copper matte takes a bessemerized matte that is dead-roasted, which is treated with a little sulphuric acid, permitting the extraction of about two-thirds of the copper contents. The full process of securing the nickel is described in the article on the Mond Nickel Co., Ltd.

CHAPTER VIII.

The Electrometallurgy of Copper.

For many years the possibility of electric smelting has excited the interest and efforts of scientists and practical metallurgists. Much experimental work has been done, and substantial progress has been gained, though no process of electrical smelting has been demonstrated fully successful. The first serious work in this line was done by Héroult, whose initial experiments on 7% sulphide ores gave mattes up to 45 per cent. in copper tenor, with slags carrying only 0.1 to 0.2 per cent. copper. Electrodes of carbon are used in smelting, and one of the principal difficulties encountered in actual work results from arcing, troubles from short-circuiting having given the most serious difficulties encountered in efforts at electrical smelting. Basing the figures upon the experiments of Héroult, about 3,000 horsepower are required for the operation of a hundred-ton furnace, and the consumption of carbon electrodes is 6 to 7 kilograms per ton of ore treated. Many electrical furnaces have been patented, but none are in commercial use as yet, on copper ores, though substantial progress has been made in the electrical reduction of iron ore. As yet there remain serious practical difficulties in the way of successful copper smelting by electrical energy, though these are being overcome, gradually, but the process, even if perfected, remains too costly for general use. It seems probable, however, that some form of electric smelting will become sufficiently perfected, within a comparatively short time, to permit its use in districts where large water powers can be harnessed at cheap cost, and where carbonaceous fuel is unusually costly.

There have been numerous attempts at the direct reduction of copper ores by electrolysis, and some of the experiments have given encouraging results. The Borchers process provides for the direct electrolytic reduction of 80 per cent. copper matte, but it does not seem that matte would furnish very satisfactory anodes. The most promising of the electrolytic direct reduction processes is that of Dr. Laszczynski, which was being utilized, in 1907, in Poland and near Semipalatinsk, Siberia. By this process ores are first crushed, then, if sulphides, are briquetted and roasted, to produce a mixture of copper oxide and sulphide. The roasted ore is then leached with dilute sulphuric acid, the product being a solution of copper sulphate, which is subjected to electrolysis, with the use of insoluble anodes. By means of an electric current the copper sulphate is separated into copper and SO_4, one atom of oxygen from the SO_4 escaping, leaving sulphur trioxide, which combines with water to form sulphuric acid. The ferrous sulphate in the anode, or rather in the electrolyte, is converted into ferric sulphate, which exercises upon the cathode a dissolving force equal to that of dilute nitric acid, reducing precipitation by fully one-half and giving a low grade and brittle metal in the cathode. The iron salts exist, necessarily, in the blue-stone in large quantities, and are decidedly pernicious, but the process provides for the continuous making of sulphuric acid in the electrolyte. The anodes are of sheet lead, covered with thick cotton cloth.

Previous to a description of the actual process of electrolysis, it seems desirable to give consideration to the impurities existing to greater or less extent in all unrefined copper. The two most desirable features of copper are tensile strength and electrical conductivity, even the brass founders depending largely upon the conductivity test in purchasing copper. Tests for conductivity must be made with great care, as a variation of 1° Fahrenheit from the standard causes a variation of 0.2 per cent. in conductivity. Annealed wire gives the highest percentage of conductivity, hard drawn wire of the same metal testing 2.5 to 3 per cent. lower.

No absolutely pure copper is supplied commercially, but the best electrolytic brands are of unusual purity, some ranging above 99.95 per cent. copper, but containing gold, silver, iron, bismuth and arsenic in very minute quantities. The best grades of Lake Superior copper also are very pure, but contain small quantities of silver, iron and arsenic. Occasionally aluminum, silicon and phosphorus are added in small quantities, on account of their ability to deoxidize copper injured in heating. Molten copper has the property of absorbing such gases as hydrogen, carbon monoxide, carbon dioxide and sulphurous anhydride, which are set free on solidifying, causing difficulty in making solid castings and necessitating great care to prevent porosity. There are many mixtures of copper with zinc, tin, aluminum and other elements, forming useful alloys, which are treated elsewhere in the chapter devoted to alloys of copper.

The impurities found to greater or less extent in manufactured copper are upwards of twenty in number, including aluminum, antimony, arsenic, bismuth, cadmium, carbon, cobalt, gold, hydrogen, iron, lead, manganese, nickel, oxygen, phosphorus, selenium, silicon, sulphur, silver, tellurium, tin and zinc.

Aluminum, as shown by the experiments of Addicks, when added to copper to the extent of only 0.006 per cent., brought the conductivity of the copper down to 98.6 per cent., and the addition of 0.739 per cent. aluminum reduced the conductivity of the copper so alloyed to 43.5 per cent. The factor of ratio of aluminum in reducing the electrical conductivity of copper is 500, aluminum ranking between antimony and arsenic as a deleterious element in reducing electrical conductivity.

Antimony, like iron and arsenic, exists in most commercial copper, though usually found in small quantities. In small quantities, antimony renders copper both red-short and cold-short, but under 0.5 per cent. does not seem to greatly affect the ductility of copper, though 0.2 per cent. causes copper sheets to crack at the edges when rolled. The bad effects of antimony are partially neutralized by arsenic, but are intensified by tin, aluminum or manganese, when found in copper. Antimony to the extent of 0.0071 per cent. lowers the conductivity of copper by 1 per cent., the factor of ratio in reducing electrical conductivity being 190.

Arsenic, found in small quantities in all commercial copper, does not seem to affect the ductility of copper when existing in quantities of less than 0.1 per cent., and copper containing 0.2 per cent. arsenic can be rolled hot and is highly malleable. Arsenic in small quantities renders copper both red-short and cold-short. Arsenic is extremely bad for wire-bars, reducing ductility and conductivity, but for many uses is advantageous because giving a harder copper than the pure article. Arsenic gives no particular

trouble in smelting, but when found in copper in any considerable quantity requires elimination by electrolysis, unless arsenical copper is required for special use. Arsenical copper should contain at least three times as much arsenic as lead and bismuth combined, but should not exceed 0.6 per cent. arsenic. Arsenical copper is harder and tougher than ordinary refined copper, and has greater tensile strength. Arsenic to the extent of 0.0013 per cent. lowers the conductivity of copper by 1 per cent., the factor of ratio for lessening the conductivity of copper being 720, arsenic ranking second only to phosphorus in this respect.

Bismuth, all things considered, is the worst enemy of copper, and highly bismuthiferous ores of copper are smelted rarely, except when carrying large quantities of silver, but bismuth in small quantities is found in most sulphide ores. Bismuth is not so objectionable in smelting as in the finished metal, but can be eliminated easily, to all but a trifling extent, by electrolytic refining. In small quantities bismuth renders copper both red-short and cold-short, and the addition of only 0.002 per cent. bismuth renders copper so brittle that it cannot be rolled. The bad effects of bismuth are partially neutralized by arsenic, but are intensified by tin, alumium and manganese, when found in copper. The factor of ratio of bismuth for reducing the electrical conductivity of copper is only 4, the effect of bismuth on conductivity being so slight as to be negligible.

Cadmium, sometimes found in very small quantities in finished copper, has a factor of ratio of 9 in reducing electrical conductivity.

Carbon, in the form of carbon monoxide or carbon dioxide, may be absorbed by copper at a critical pitch of the metal, producing porosity in castings, though apparently having no other effect.

Cobalt, sometimes found in refined copper to a small extent, has about the same effects as iron or nickel, and usually is found associated with nickel, when occurring as an impurity in copper.

Gold exists only as a mere trace in electrolytic copper. The factor of ratio in reducing electrical conductivity of copper is 10.

Iron is found in practically all commercial copper, in quantities ranging from a mere trace up to appreciable percentages. In large quantities, iron is a deleterious impurity, but in small quantities seems to form an alloy with the copper, and does no appreciable damage, other than to slightly reduce electrical conductivity.

Lead, next to bismuth and arsenic, is the most damaging impurity found in ordinary commercial copper. Lead to the extent of 0.02 per cent. renders copper so brittle that it cannot be rolled, and 0.5 per cent. renders copper cold-short, while lead in copper to the extent of 1 per cent. ruins the copper for all purposes except casting, for which use the lead is a positive advantage, as it largely prevents the porosity so frequently found in cast copper. The bad effects of lead are partially neutralized by arsenic, but are intensified by tin, aluminum or manganese, when occurring as an impurity in copper. The factor of ratio of lead for reducing the conductivity of copper is only 3, this being the least harmful to conductivity of any element, and being only one-half as harmful as silver, as regards electrical conductivity, notwithstanding that silver is the most perfect conductor of electricity that is known.

Manganese sometimes occurs as an impurity in copper, to a small extent. Manganiferous copper containing 2 to 3 per cent. manganese is harder

and has greater tensile strength than pure copper, but should not contain more than traces of lead or antimony.

Nickel, in very small quantities, is a common impurity of copper, and has about the same effect as iron, reducing electrical conductivity slightly, but having no other apparent bad effect. Copper containing 2 to 3 per cent. nickel is harder and of higher tensile strength than pure copper, but should not contain more than traces of lead or antimony.

Oxygen unites with copper readily, in the form of cuprous oxide, and practically all refined copper contains a small fraction of one per cent. cuprous oxide. Up to one per cent. cuprous oxide does not affect malleability, if no other impurity is present in considerable quantities. Cuprous oxide will melt at red heat, without decomposition, and frequently becomes a component part of the refined copper. Cupric oxide in small quantities has no apparent effect on the metal, but in quantities of one-half per cent. or more lowers ductility, though not injuring the metal in other respects, even in quantities up to 10 per cent. The factor of ratio in reducing the conductivity of copper is 25, oxygen usually being found in the metal in the form of cuprous oxide.

Phosphorus, to the extent of 0.2 per cent., gives copper that can be rolled hot, and is highly malleable, but in small quantities renders copper cold-short, and, if present to the extent of 0.5 per cent., causes red-shortness. Phosphorus copper, which is harder than pure metal, should contain 99.7 per cent. to 99.8 per cent. copper, 0.05 to 0.1 per cent. phosphorus and not more than 0.04 per cent. oxygen. Phosphorus is the most deleterious element known, so far as affecting the electrical conductivity of copper, and if present in copper to the extent of 0.08 per cent. lowers conductivity to 52.3 per cent., the factor of ratio for reduction of electrical conductivity of copper being 3,000, the highest known.

Selenium occurs occasionally in crude copper, but can be eliminated quite thoroughly by electrolysis. It would seem that the peculiar physical properties of selenium should give it a greatly increased market, and in such case the metal can be secured in considerable quantities, as a by-product from electrolytic refineries.

Silicon, in even small quantities, renders copper red-short, but up to 2 per cent. does not affect ductility. Three per cent. causes brittleness, and copper containing above 5 per cent. silicon is too brittle for any ordinary use. Silicon to the extent of 0.007 to 0.042 per cent. reduces the electrical conductivity of copper less than 1 per cent., the factor of ratio for lessening the electrical conductivity of copper being 70.

Silver, which is quite thoroughly eliminated by the electrolytic process, sometimes is found in electrolytic copper to the extent of an ounce or so per short ton, and in commercial blister copper frequently is present to a much greater extent, especially in Lake copper. Silver in small quantities has no appreciable bad effect on finished copper, except for a very slight reduction of electrical conductivity, the factor of ratio for lessening the electrical conductivity of copper being only 6.

Sulphur usually is found in blister copper in the form of barium sulphate. When present to the extent of 0.25 to 0.5 per cent. sulphur causes cold-shortness, but the injurious effect may be offset by the addition of manganese or aluminum. The factor of ratio of sulphur for reducing the electrical conductivity of copper is only 8.

Tellurium, to the extent of even 0.001 per cent., renders copper appreciably red-short, and slightly larger quantities render the copper both red-short and cold-short. Tellurium has much the same effect as arsenic on copper, but to an intensified degree, and when present to a very small extent renders copper of wonderful hardness. Its use is recommended to those who are endeavoring to temper copper. Tellurium does not greatly affect the ductility of copper, and Sperry states that tellurium in high brass does not affect rolling, unless present in quantities of more than 0.1 per cent., when the brass cracks in rolling. The factor of ratio for lessening the electrical conductivity of copper is only 4.

Tin, in small quantities, renders copper red-short and brittle, but ductility can be restored, at least partially, by heating to cherry red and cooling suddenly. Copper containing 0.2 per cent. tin can be rolled hot, and is highly malleable. When present to the extent of 1 per cent. or upwards, tin materially lessens the ductility of copper. The factor of ratio of tin in reducing the electrical conductivity of copper is 67.

Zinc, as an impurity in copper, causes trouble in smelting, though not a highly deleterious impurity in the final product. When present in copper, to the extent of 0.2 per cent., zinc causes the sheets to crack at the edges when rolled, and in considerable quantities lessens ductility. The factor of ratio of zinc in reducing the electrical conductivity of copper is 30.

The great bulk of the world's copper production, with the exception of the Lake Superior output, is refined electrolytically. The principal advantages of electrolytic refining are that gold and silver values contained in the blister copper are saved, practically intact, while the product of the electrolytic refineries is a copper of unusual purity. The principle of electrolysis, or the parting of metals and the redeposition of one selected metal by the aid of a continuous electric current, was discovered in 1835, by Michael Faraday. As early as 1836 Becquerel planned works for the electrolytic recovery of copper and silver, but, owing to the prohibitive cost, the effort was abandoned. The first patents relating to electrolytic refining were taken out by Elkinton, of Birmingham, in 1865 and 1869, and in 1870 a plant was built at Swansea to utilize this process. A little later several small electrolytic refineries were built in Germany and France, and in 1879 the first American refinery to use electrolysis was erected in Phoenixville, New Jersey, this being followed, in 1881, by the construction of the Balbach works, at Newark, New Jersey, the latter named plant being the first to do electrolytic refining of copper on a considerable commercial scale. Shortly after the construction of the Balbach works, new plants of considerable importance were built in both France and Germany, followed, at a slightly later date, by the construction of new electrolytic plants in England and Wales. Previous to the opening of the great Boston & Montana electrolytic plant, at Great Falls, Montana, in 1893, electrolytic copper was produced mainly in Europe, but America now furnishes more than half of the electrolytic copper production of the world, doing electrolytic refining of blister copper from South America and Australia, as well as from the United States, Canada and Mexico.

Considerable secrecy regarding processes is maintained at many electrolytic refineries, but while the practice varies at different plants, the fundamental principles are the same in all works, and are understood by all competent operators. There are two principal systems of electrolytic refin-

ing, with numerous minor modifications. The series system uses rolled sheets, requiring a special rolling mill, and has electrodes in series and tanks in series, or, more frequently, in multiple series. The multiple system uses cast anode plates of 1 to 2.5 inches thickness, requires a much smaller electromotive force than the series system, and is in much more general use.

The tanks in which the process of electrolytic segregation and redeposition is carried on may be of wood, lead or slate, usually the former, though lead seems preferable. The wooden tanks usually are lined with lead, tarred felt or asphalt. The tanks may be set upon the floor, usually of cement, or may be sunk, leaving the tops about flush with the floor, to permit easier handling of the material. Tanks are terraced, in series, providing for a natural circulation of the electrolyte, which is pumped into the upper tanks and flows thence, by gravity, from tank to tank, until the bottom terrace is reached, when again pumped to the upper tanks. The Baltimore refinery uses tanks 9x2x2.5 feet in size, containing 130 electrodes of two plates each, giving a total weight of 5,700 pounds of charge, the process being carried on at a temperature of 20° Centigrade, with a power cost of about twenty dollars per horsepower year.

Connections between dynamos and tanks are made of high conductivity copper, necessarily of large size, to carry the heavy current used, and are of varying forms in cross-section, overlapping slabs of high conductivity copper being used at some plants.

The crude copper, mainly blister copper produced by bessemer conversion, may reach the works already cast in anodes, but usually arrives in pigs, and the anode bars usually are cast from blister copper melted in a cupola furnace, kept running for the purpose, and are cast in a variety of forms, usually in thin plates with projecting lugs that rest on the sides of the tanks, one lug resting on the electrical conductor, while the other is insulated. Lugs of anodes and cathodes vary in width, permitting each to make direct contact with the poles. The average American anodes average 98 to 99.5 per cent. in copper tenor, and the auriferous and argentiferous varieties carry up to 40 ounces gold and 300 ounces silver per short ton, with from a trace to 2 per cent. arsenic, and with variable quantities, usually small, of iron, nickel, antimony, bismuth, sulphur, silicon, selenium and tellurium, and with occasional minor impurities. After the process of electrolysis has been carried on until the anodes, usually rectangular in form, are worn down to about 15 per cent. of their original weight, the remaining portions are removed, melted down and recast.

The composition of the electrolyte, which is the fluid in which the process of electrolysis is carried on, varies at different works, carrying 5 to 10 per cent. sulphuric acid and 15 to 20 per cent. bluestone, added to 70 to 80 parts of water. The average composition is 6 to 9 parts of acid and 16 to 18 part of bluestone. It is desirable that the electrolyte have a sufficiently high percentage of sulphuric acid to render its specific resistance very low. The electrolyte frequently carries a very small percentage, as low as one part in two hundred millions, of some soluble chloride, usually sodium chloride, for the purpose of precipitating silver in chloride form, sodium chloride also tending to slime antimony in the form of an oxychloride. When the electrolyte becomes too foul for satisfactory use it is purified,

brought up to the proper standard and pumped back into use. Purification usually is accomplished by working up, at regular intervals, a certain quantity of electrolyte into bluestone, and adding fresh acid. The solution deteriorates more rapidly at the higher temperatures and the low current densities, apparently in direct ratio to anode loss and cathode gain. Nickel sulphides go into the electrolyte to some extent from nickeliferous copper anodes, and arsenic also passes into the electrolyte to a considerable degree, causing trouble in elimination. The easiest method of eliminating arsenic is to reduce the electrolyte to bluestone before purification.

In the process of electrolysis metals are dissolved at the negative pole of a battery, taken into solution in the electrolyte and redeposited from the electroylte at the positive pole, where free circulation is permitted in a favorable solution, with a proper electric current. Varying currents give varying effects, and some metals pass over more freely than others, copper being one of the first to pass over. Apparently the impure metallic copper of the anode is first broken into cuprous sulphate, from which are derived the molecules of practically pure metal that are deposited on the cathodes. In actual work there is a slight redissolution of the metal from the cathode, but this is not of sufficient extent to prove seriously detrimental. Good adherent copper can be obtained on the cathodes at almost any current density, providing there is a sufficient rate of circulation of the electrolyte. Current density is employed up to 3.5 amperes per square decimeter, but the usual ratio is a current density of 14 amperes per square foot, at a temperature of 50° Centigrade. As the unrefined copper in the anodes contains a variety of metals and metalloids, it is important that the electrical current be so regulated that the minimum of other elements pass over to the cathodes at the same time as the copper. The adjustment of the varying factors of composition and circulation of the electrolyte, current density and temperature, call for nice discrimination, to be secured only by experience and care. The matter of temperature is one of prime importance, as the cost of power decreases with rising temperature, within certain limits, and the heating of the electrolyte not only facilitates the process of decomposition, circulation and redeposition, but produces also a smoother deposit of copper on the cathodes. Covered tanks are used extensively, to increase the temperature at which the work is done, and the best results seem to be secured at a temperature of about 70° Centigrade, equal to 158° Fahrenheit.

The cathode plates are made of strips of rolled copper, of one-eighth to one-fourth inch thickness, cut into varying sizes and forms, though usually rectangular. The cathode plates are oiled and coated with fine graphite, to promote deposition, and sometimes have lead lugs soldered onto them for handling.

While the copper and minute quantities of other impurities pass over to the cathodes, the great bulk of the impurities contained originally in the anodes is first taken into circulation in the electrolyte, and then precipitated to the bottom of the tank, as sludge or slimes. If more than traces of impurities are carried over to the cathodes it is because the electrolyte has become foul, or the current is wrong. Constant watchfulness is necessary, as apparently slight causes may bring about serious disarrangements of the process, at any point. The sludge precipitated to the

bottom of the tank may form a conductor, causing short-circuiting, and should be removed frequently, as large accumulations are reasonably certain to cause trouble.

An average anode slime runs about 40 per cent. silver, 25 per cent. copper and 2 per cent. gold, with about 10 per cent. arsenic, antimony and bismuth, the combined balance consisting of lead, silicon, sulphuric acid and minor impurities. The slimes contain greatly varying percentages of gold and silver, according to the nature of the copper treated. Slimes are removed from the bottoms of the tanks by bailing, or siphoning, and are taken to the slime-tank, where the copper scraps are picked out by hand. At some plants the slimes are put through a filter press and dried, though this is not customary. Slimes are treated generally with sulphuric acid and sodium nitrate, air and steam being admitted for agitation and heating. The copper is dissolved very readily as cuprous sulphate, by treating with ferric sulphate, and is recovered as bluestone. The arsenic also is removed by treatment with sulphuric acid and sodium nitrate, and after the removal of the copper and arsenic the remaining material is dried and smelted with soda, to slag the antimony, the impurities being oxidized by the nitrate. The doré bullion produced by this process usually is parted with sulphuric acid, but sometimes is parted mechanically, with a silver nitrate bath. Tellurium requires prolonged furnace treatment for burning off, though not especially difficult of elimination, if sufficient time is taken. Both selenium and tellurium, especially the latter, could easily be recovered from the slimes, if there were sufficient market to take the considerable quantities of these rare elements that could be furnished by the electrolytic refineries.

The process of electrolytic refining necessarily is continuous, two to four weeks being the average time required for the making of a cathode. Including time required for remelting and for other purposes, five to six weeks usually are required for the making of finished cathodes from rough copper, though much better time has been made under exceptionally favorable circumstances. The rate of progress depends quite largely upon the nature of the anodes, the process of electrolysis being greatly facilitated and cheapened by comparatively pure anodes. Mechanical devices have reduced greatly the number of workmen required about a well-quipped electrolytic plant, and have obviated most of the heavy manual labor required formerly. Traveling cranes and overhead trolleys provide expeditious means of handling both anodes and cathodes, and the electrolyte is handled by pumping, while as a rule the slimes are taken from the tanks by siphons, rather than by the old process of hand-bailing.

The cathodes produced by electrolytic refining average 99.93 to 99.9 per cent. in copper tenor, hydrogen being the chief impurity. The objectionable impurities are those that decrease electrical conductivity or render the metal brittle, the principal impurities to be guarded against being arsenic and antimony, which decrease conductivity, and lead and tellurium, which cause brittleness. Antimony and bismuth are seldom present in sufficient quantities to cause injury. The impurities in electrolytic copper usually include silver, to the extent of one-tenth to one ounce per ton, and a trace of gold, but these impurities are in nowise deleterious, though representing a loss to the refiner. Most copper ores contain silver, and the majority contain gold, in varying quantities, the copper mines of Utah being

richer in gold than those of any other American state, followed in turn by Arizona and California. In silver, the copper mines of Montana lead, followed closely by Utah, and, at a little distance, by California and Arizona. The immense importance of the precious metals obtained as by-products from the electrolytic refining of copper is shown by the figures of such production from American copper mines in 1904, amounting to 237,116 ounces of gold and 15,769,327 ounces of silver.

Electrolytic copper is in very minute crystals, while Lake copper is in crystals of considerable size, this difference in the size of the crystals being readily apparent to the naked eye on fractured faces. The larger crystals apparently are responsible for the superior tensile and torsional strength and ductility of Lake copper, but the toughness of Lake copper disappears under electrolytic refining, the product varying in no essential particular from all other electrolytic coppers, which come out of the bath as like as peas from a pod.

The cost of electrolytic refining varies from $8 to $20 per ton, according to circumstances. Unlike smelting, which usually best can be done near the mines, to save excessive freight charges on worthless material, electrolytic refining is performed, in most cases, nearer to consumer than to producer. The extra freight paid on one to four per cent. of impurities contained in blister copper is so very small a fraction of the total transportation charges that this loss is more than offset by the advantages of cheaper labor, cheaper fuel and better transportation facilities found along the Atlantic seaboard in the United States, where a considerable amount of foreign copper is refined, as well as the bulk of the domestic production.

CHAPTER IX.

The Alloys of Copper.

The work of alloying the metals is a special branch of the metallurgical art, requiring much technical skill and experience, owing to the different melting points of the component metals, and their different capacities of oxidation and volatilization. Insufficient heat causes segregation of the different constituents, in the case of many alloys.

Zinc is the metal most commonly alloyed with copper, the product being brass. The proportions of the two metals vary greatly, ranging up to equal quantities, in the case of very high brass. Ordinary high brass is composed of two parts copper and one part zinc, and is of a light yellow color. Low brass ranges from 75 to 88 per cent. copper and 12 to 25 per cent. zinc, and is considerably ruddier in color than high brass. The addition of lead, to a small extent, usually not exceeding 5 per cent., gives an improved color to brass, and renders the metal more suitable to machining, as well as slightly reducing the cost. Ordinary commercial brass frequently contains 2 to 5 per cent. tin, which gives added strength and density. There also are special brass alloys containing lead, aluminum and manganese, in addition to copper and zinc. Brass is a much poorer conductor of heat and electricity than copper, and is more easily fusible.

Tin is mixed with copper in a variety of proportions, giving a considerable range of bronzes, with rather remarkable variations in their physical characteristics. Bronze probably is the most ancient alloy known to man. An alloy of 97 per cent. copper with 3 per cent. tin, practically a bronze, makes good sheathing metal. A small quantity of tin added to copper causes it to become brittle, but the ductility can be restored, at least partially, by heating to a cherry red, and cooling suddenly. Ancient bronze for tools and weapons ranges from 85 to 92 per cent. copper and 8 to 15 per cent. tin. Ancient bronze medals carry 8 to 12 per cent. tin. Ancient bronze mirrors contain 20 to 30 per cent. tin. Flexible bronze contains about 95 per cent. copper and 5 per cent. tin. Gun metal ranges 90 to 91 per cent. copper and 9 to 10 per cent. tin, and if the percentage of copper is increased the gun metal becomes liable to liquation. Bell-metal contains 80 to 84 per cent. copper and 16 to 20 per cent. tin. This is highly sonorous, when cast in bells, and makes good castings, but is decidedly hard, brittle, and difficult to work. Sudden cooling reduces the brittleness and restores the hardness. Bell metal is malleable at a low heat and can be forged, if handled very carefully. Speculum metal contains about 75 per cent. copper and 25 per cent. tin, and is harder and whiter than bell metal, and even more brittle and difficult to work.

Brass-bronzes are used for a variety of purposes, and for certain specific uses alloys composed of copper, tin and zinc are preferable to either brass or bronze. Bearing brass is much harder than common brass, and contains 80 to 82 per cent. copper, 10 to 14 per cent. tin and 2 to 4 per cent. zinc, being a brass-bronze rather than a brass. A cheaper and less efficient

bearing brass contains a smaller percentage of copper and a greater proportion of zinc. Muntz's metal is brass containing 60 to 62 per cent. copper and 38 to 40 per cent. zinc, and commonly carries about 0.2 per cent. in iron, nickel, tin, arsenic, or manganese, usually as a combination of several of these elements. There are a number of proprietary anti-friction metals having copper as a base, with varying proportions of tin and zinc, these being as a rule more closely allied to bronze than to brass, though a cross between the two metals.

Aluminum is the base of a number of important copper alloys, and the tensile strength and ductility of aluminum wire are much improved by the addition of as little as 1.5 per cent. copper. Aluminum bronze is a bronze containing about 3 per cent. aluminum, used largely for water-tube boilers. Several varieties of aluminum bronzes show high tensile strength, and an alloy of 96 per cent. copper and 2 per cent. aluminum gives a strong and fairly rigid metal. Albradium is an alloy having aluminum for its base, with the addition of copper, nickel, zinc and phosphorus. This alloy takes a very high polish and has good tensile strength. Aluminum alloyed with small quantities of nickel and copper has shown a tensile strength of 40,000 pounds per square inch.

Nickel copper, containing 2 to 3 per cent. nickel, is harder and of higher tensile strength than pure copper, but should not contain more than traces of lead or antimony. Monell metal is a natural alloy of copper and nickel, made from the nickel-copper ores of the Sudbury district. German silver is an alloy of 5 parts copper, two parts zinc and one part nickel.

Steel has been alloyed with nickel and copper, the latter to the extent of about 0.5 per cent., for the facing of compound armor plate, and this metal is said to resist corrosion as well as wrought iron.

Manganese, to the extent of 2 to 3 per cent., alloyed with copper, gives a product that is harder and of higher tensile strength than pure copper, if containing no more than traces of lead and antimony.

Arsenic alloys readily with copper, such alloys offering phenomena that are not fully explained by the chemical and metallurgical knowledge of the present day. Alloys of copper and arsenic are known usually as blanched copper, or speiss. Arsenical copper should contain at least three times as much arsenic as lead and bismuth combined, but should not exceed 0.6 per cent. arsenic, unless it be considered an alloy. Experiments on binary alloys of copper and arsenic show that arsenic lowers the melting point, down to about 20 per cent. arsenic, reaching the lowest point of fusion at 685° Centigrade, with an alloy of 19.2 per cent. arsenic, corresponding to the formula Cu_4As. With increase of arsenic the fusion point is raised to 747°. Centigrade with 28.34 per cent. arsenic, which corresponds to the empirical formula Cu_2As, and to 810° Centigrade with 32.2 per cent. arsenic, corresponding to the formula Cu_3As_2, an alloy with 37.4 per cent. arsenic giving the formula Cu_3As. The practical limit of the direct binary compound of copper and arsenic was reached with 41 per cent. arsenic, corresponding to the formula Cu_7As_4. The alloy of 19.2 per cent. arsenic gave a surface of pale blue color, the alloy of 28.34 per cent. gave a deep blue, 30 per cent. gave light purple, and 32.2 per cent. gave a reddish purple color to the surface of the alloy.

Mercury alloys with copper in the proportion of three parts of copper

to seven parts of mercury, making a copper amalgam known as Viennese metal cement.

Phosphorus, in small quantities, renders copper considerably harder than when pure. Phosphorus copper should contain 99.7 per cent. to 99.8 per copper, 0.05 to 0.1 per cent. phosphorus, and not more than 0.04 per cent. oxygen.

Strontium and tungsten, in small quantities, alloyed with brass, give a golden metal of great tensile strength, strongly resistant to atmospheric influences. The alloy contains 60.8 per cent. copper, 37.6 per cent. zinc, 0.4 per cent. tin, 0.3 per cent. strontium, 0.3 per cent. tungsten, 0.3 per cent. aluminum, 0.2 per cent. manganese and 0.1 per cent. iron.

Tellurium, in small quantities, renders copper of wonderful hardness, though also causing it to become red-short, having much the same influence on the metal as arsenic, but to an intensified degree.

Gold and silver are alloyed with copper for coinage purposes, and for trial plates and medals.

Imitation gold, bearing a striking resemblance to the real article, is made by an alloy of copper, tin, nickel, silver and aluminum.

CHAPTER X.

The Brands and Grades of Copper.

Copper is placed on the market in a variety of grades and shapes, descriptions of which are appended.

Lake copper is the product of the native copper mines of Lake Superior. Lake copper varies greatly in characteristics, and materially in price, the Calumet & Hecla brand being nearly as free from impurities as the best electrolytic copper, while the Copper Range metal is highly arsenical, and between these grades there is a great variety of brands made by different mines. The lake copper is the toughest that is made, hence is especially suitable for wire-drawing or cold-stamping. The best brands of lake copper command a premium over electrolytic, this varying from time to time, but averaging about one-eighth cent per pound. The standard of conductivity of lake copper is 99.5, but there is a considerable range of conductivity among the various brands, this running as low as 91 per cent. in Wolverine copper and as high as 101 per cent. in the metal from the Quincy and Michigan mines. Lake copper possesses greater tensile and torsional strength than is found in other brands. In addition to the domestic market, lake copper finds a limited but steady demand in Europe, for all uses where copper of special toughness is required, as in the making of cartridge cases, metallic buttons, etc.

Electrolytic copper is copper from any source that has been refined electrolytically, and the cathodes average about 99.93 per cent. fine. Copper made by this process is the purest chemically that is on the market, and is the best conductor of electricity, having conductivity up to 103, but lacks the toughness of lake copper, hence is not so suitable for wire-drawing or cold-stamping, but for some other uses is preferable, and for most purposes there is little choice between lake and electrolytic.

Approved brands of copper are those that have been approved by the London metal market, and include practically everything that would pass as standard copper.

Best selected copper averages about 99.75 per cent. fine, and is used largely by brass foundries for making brass castings, rolling brass sheets and drawing brass tubes.

Tough cake is practically the same as best selected copper in the English market, prices being the same, and is used mainly for rolling and for tube and cylinder making. The average tenor is about 99 per cent. copper, and this grade usually contains a little lead, which is no particular detriment for the uses noted.

Tough copper is practically the same as tough cake, and is used for wires and sheets.

Ingot copper is rated in the English market with tough cake, and is practically selected copper.

G. M. B. copper is the usual abbreviation for good merchantable brands.

Good merchantable brands of copper, a term formerly used extensively in the English market, is now generally known as standard copper. The

old title was so misused that it deteriorated sadly, and became very indefinite, in time including almost anything that could be called copper.

Chili bars are bars of blister copper from Chile ranging 95 to 99 per cent. in copper tenor. The term is in much less general use than formerly, and most of the Chili bars are sold as standard copper.

Standard copper covers almost anything carrying 96 per cent. copper, and includes considerable metal that is decidedly inferior, much of it containing very undesirable impurities. The price ranges two to three pounds sterling per ton under the market price of tough copper. The average tenor of standard copper probably is about 97 per cent. Standard copper is more a standard for speculation, in the metal market, than a grade for actual consumption, as most of the low-grade copper included under this name is used either as casting copper, or is brought up to high grade by electrolytic refining.

Rough copper is practically the same as standard copper.

Casting copper is rough metal, not suitable for the manufacture of wires or sheets, containing considerable impurities of a serious nature, being suitable only for casting purposes.

Tile copper is brittle, and is suitable for casting only, hence usually is graded as casting copper, in the English market.

Scrap copper is the remnants from the manufacture of sheets, wire, etc., and is of good average grade, though in undesirable form, but can be melted down into cakes or ingots.

Copper is placed on the market in a variety of forms, which are listed as follows:

Ingots are cast in two sizes, the standard weight being about 60 pounds avoirdupois. Copper is put up in this form mainly for casting purposes, the two deep depressions in the top of the ingot being provided to facilitate the cuting of the ingot into three parts.

Wire bars are cast 3 to 4 inches square and 3 to 7 feet in length, averaging in weight 300 to 400 pounds, and, as the name implies, are used for wire-drawing.

Cakes are cast square, in weights of 100 pounds or upwards, some special cakes for the Russian market weighing as high as 4,000 pounds each. Copper in this form is used almost exclusively for rolling into sheets.

Moulds are somewhat similar to cakes, and are used mainly for rolling into sheets.

Anodes are cast in plates about 2 by 3 feet in size, and have an average thickness of about 1½ inches, with an average weight of about 250 pounds. Crude copper from the furnaces is cast into anodes for electrolytic refining.

Cathodes are of approximately the same size as anodes, except that they are much thicker at the top than at the bottom, and while the copper contained is exceptionally pure, it is in crystalline form, and the cathodes are melted down and run into other shapes, cathodes rarely appearing on the finished copper market.

Flat bottoms are circular copper sheets, used for making copper boilers, pans, etc., and in the English market command a slight premium by reason of being partially manufactured shapes.

Sheet copper is cold-rolled metal, and commands a premium by reason of being partially manufactured.

Sheathing copper is hot-rolled metal, and, like sheets and bottoms, commands a premium over ordinary brands by reason of being partially manufactured.

The various alloys of copper, some of which are of considerable commercial importance, are treated in the preceding chapter, devoted to alloys.

Tempered copper is a will-o-the-wisp that is referred to frequently. Many inventors, usually poorly equipped with technical skill, have wasted much time in efforts to rediscover the "lost art" of tempering copper, and, on an average of once yearly, the American press contains long articles giving hazy details of a rediscovery of the process of tempering copper to the hardness of steel, such wonderful discoveries usually being made by blacksmiths in Maine, cobblers in Pennsylvania, farm-hands in Illinois or cow-punchers in Texas. A typical example of one of these processes is furnished by a lady in the state of Washington, who puts a razor edge on copper tools by adding an ounce of bluestone to a hundred pounds of copper, while molten, and, if an especially fine edge is desired, an ounce of bichromate of potash is added to the charge. The lady inventor evidently is a homœopathic metallurgist. It is doubtful if the mound-builders of America possessed any special art of tempering copper, as it has not been proven that the copper tools of the ancients were harder than those made from modern copper. If tempered copper were greatly to be desired, it is probable that it might be furnished with the aid of tellurium, a small quantity of which renders copper exceedingly hard, but as tempered copper merely would replace steel, in most instances, and as steel is very much the cheaper of the two metals, a perfect process for tempering copper seems unnecessary.

CHAPTER XI.

The Uses of Copper.

Iron, copper and zinc are the three indispensable metals of the present age. The less of tin, or lead or even of nickel or aluminum would be a severe blow, working great hardship, and, even were we to be deprived of such apparently insignificant metals as antimony, cobalt, manganese and platinum, the industrial world would suffer a loss entailing disastrous consequences. The taking away of gold and silver, and that useful thief-taker, mercury, which catches most of the world's gold supply, would reduce the finances of the globe to chaos. Iron and copper, however, are the main pillars of the metallic structure, while zinc, in addition to many other virtues, possesses the unique quality of being the only electrically negative metal, and, without it, copper, for electrical uses, would be much like a "pair" of scissors with but a single blade.

Many great industries are dependent upon the metal copper, which, directly and indirectly, affords employment of some hundreds of thousands of persons, mainly skilled workmen, and adds nearly or quite five hundreds of millions of dollars yearly to the wealth of the world. Copper is nearly as indestructible as the precious metals, and its life is infinitely longer than that of iron or steel, as has been brought to attention by more than one archæological discovery, in which bronze weapons or implements were practically intact, while those of iron or steel were represented merely by streaks of rust.

The engineering trades take nearly half of the total copper production of the world, and, until about 1890, used nearly or quite four-fifths of the entire output of this metal. Since that time has been witnessed the wonderful development of the various branches of the electric industry, and, at the present time, electricity, in some of its various forms of energy, is the largest single user of the metal, with every indication that the electrical requirements of the future will continue to expand, almost indefinitely.

Electrical machinery, as dynamos or motors, is a heavy consumer of copper and brass, but the principal consumption of copper for electrical uses is in the form of wire, for the transmission of energy to be used for power, traction and lighting, and for the electrical impulses providing the conveyance of messages. Copper is an integral factor of prime importance in all electric installations, and for the transmission of power, light and telegraphic or telephonic impulses, is a necessity. It is true that iron wires were used by the pioneers in the telegraphic and telephonic fields, but these are giving way rapidly to strands of copper. Iron is of low electrical conductivity, rendering it an inefficient and costly medium for transmission, and its lack of ductility, and the ease with which it is rusted, render it far less desirable than copper, though it is used at times because of its greater cheapness.

The life of copper wire is as yet undetermined. When laid under-

ground it is affected by electrolysis, but to nothing like the same extent as iron, and copper wire, in the atmosphere, while undergoing some surface oxidation from carbon dioxide and sulphur vapors, is but slightly affected thereby.

The trolley line of the present day, threading its way through the mazes of every city and town of any importance, and weaving a spider's web over most of the thickly populated sections of the United States, is a strictly modern affair, and may be said to date from about 1890, the earlier lines having been few in number, short in length, and of an experimental and usually unsatisfactory nature. At the end of 1906 there were upwards of 40,000 miles of trolley lines in the United States, requiring upwards of 40,000 tons of copper for power transmission alone. The average weight, in that year, of trolley wire in the United States, was 1,688 pounds per mile for short lines and 2,687 pounds per mile for long-distance power lines on interurban and well-equipped city roads. The trolley line is as yet in its infancy, and the time will come, unless some superior means of traction shall be invented later, when the United States alone will have more than a million miles of electric roads, wild as this prediction may sound at the beginning of the Twentieth Century. Furthermore, the trolley line must grow more popular in all other countries. The United States has led in the electrification of transportation lines, but the cities of Europe are now possessed, in most cases, of modern electric street railways, and it is but a question of time when interurban lines will supplement urban transportation facilities in Europe, as they now do in the United States.

In addition to the large quantities of copper required for power transmission lines, the metal is used very extensively in the motors of the cars themselves. The weight of copper in a street railway car ranges from a minimum of about 250 pounds to a maximum of nearly one ton, a forty horse-power trolley-car motor containing an average of about 800 pounds of the metal.

The electrification of steam railroads has been discussed academically since the trolley-car first became a factor of importance in the field of transportation. The work of electrifying the steam lines has proceeded but slowly, much to the disappointment of many urgent advocates of such a change, but the reasons for this slowness are not difficult to find. Thousands of millions of dollars have been invested in steam railroads, in the United States alone, and it would be folly, or worse, for those in charge of these lines to discard an old and proven motive force for a newer power, until the latter had demonstrated fully its ability to do the work more cheaply and advantageously.

In the war now on between the steam roads and trolley lines, for urban and suburban passenger business, the trolleys have had very much the better of the battle, and are now forcing the fight into the country of the enemy, by means of linking together various interurban lines, through which plan long stretches of road have been brought into single systems. On some of these lines dining and sleeping cars have been introduced, but the latter seem to be more in the nature of an advertisement, or a boast, than for practical use. The steam locomotive and the electric trolley-car have been running side by side for a sufficient length of time,

in a sufficient number of fields, to afford fair basis for comparison, and a dispassionate survey of both fields leads to the conclusion that neither is supreme, and that, for at least many years to come, the steam locomotive will hold its own, on many lines. Each method of traction has its advantages and disadvantages. It is possible to build an electric motor that will compete with any steam locomotive, as to speed and tractive power, but this would require feeding from a much heavier wire than now in use on any trolley line. For long hauls and great speed between distant points, the trolley cannot yet be held a serious competitor of the steam locomotive, while for short distances, immediate access to centers of population, and frequency of trips, the electric line has proven its great superiority to the steam road.

Electrification of tunnels and terminals has been undertaken by a number of railroads, and electric traction offers so many points of superiority for these special uses that it is certain to dispossess the steam locomotive, in the majority of cases.

It is now possible to distribute electric energy for great distances, without serious impairment or waste, and it would be folly to attempt to set a limit to the future possibilities in this field. Eventually it may be found practicable to transmit electric energy from great central stations, located at available water-powers, or in coal-fields, along many hundreds and even thousands of miles of railway line, and when that time arrives, the steam locomotive will have met its Waterloo. That steam ultimately will be displaced by electric power, in many, and probably in the majority of cases, may be accepted as a reasonable probability, but this process will be gradual, and due allowance must be made for the influence of future inventions, which may give an entirely new phase to the situation. It should be borne in mind, in this connection, that the past decade has witnessed some marvelous developments in the production of power, entirely outside of the electrical field, these including the perfection of the turbine steam-engine, great improvements in turbine water-wheels, the vast increase in scope and power of internal combustion engines, and the utilization of producer-gas. The prophet who attempts to peer too far into the future may strain his reputation, as well as his eyesight.

Hydro-electric power installations are becoming very common, throughout the world, and from these plants electric energy is distributed for distances of fifty to one hundred miles, and even for one hundred and fifty miles in the case of some of the later installations. In transmitting power for long distances, a high voltage is used, almost invariably, the current being stepped down at the point of utilization. Water power, which was the principal mechanical force of the world, one hundred years ago, but which fell into very general disuse about the middle of the Nineteenth Century, is coming into its own again, and where a stream was made to furnish a few hundred horse-power, by means of a wasteful overshot water-wheel, fifty or seventy-five years ago, the same stream now gives thousands of horse-power by means of the economical water turbine. The utilization of water power is revolutionizing the location of industries, which, for the past three generations, have been located near fuel supplies, or along the lines of least resistance in the distribution of fuel.

Electric lighting has ceased to be a novelty or a luxury, and is now

a necessity in every progressive community. There can be no question that eventually electric energy for both lighting and power purposes will be transmitted throughout the country, to such an extent that rural, as well as suburban populations, will benefit fully from its use. In 1902 the American Census Bureau reported 125,143 miles of main and feeder wires connected with electric lighting and power plants, and this network of wires must have reached nearly or quite 200,000 miles in 1907.

The telephone, invented in the last quarter of the Nineteenth Century, and not in general use until after 1880, is now found scattered throughout the length and breadth of every civilized land, and in many countries that only by a stretch of imagination could be termed more than semi-civilized. Greater New York alone possesses nearly a quarter of a million telephones. At the end of 1906 the various affiliated companies of the American Bell telephone system had in use about 375,000,000 pounds of copper wire, of which more than 50,000,000 pounds were added in 1906, the increase for that year having averaged almost exactly 1,000,000 pounds per week. In addition the thousands of smaller independent telephone systems throughout the country use tens of millions of pounds of copper wire yearly. At the beginning of 1907 the Bell system of the United States had in use sufficient wire to girdle the earth thirty-eight times, at the equator, if the wire were standardized to the size used for long-distance transmission. In addition to the requirements of the telephone companies for wire, the instruments themselves contain considerable brass, and modern desk-phones are made of brass, nickel-plated. Furthermore, an immense amount of copper is required for the big switchboards of the telephone companies, and the mammoth switchboards of the electric light, power and traction lines also are consumers of enormous quantities of the metal.

In the beginnings of telegraphy, iron wire, because of its lower cost, was used very generally, but the lower conductivity of iron, and its lack of ductility and proneness to break under stress of wind or sleet, renders iron wire, while cheaper in the first cost, much dearer in upkeep than copper, and the present tendency of the telegraph companies is to replace iron with copper wire, wherever possible, the greater initial cost being more than offset by the far greater life and assurance of good service given by copper. The various ocean telegraph cables, of which there are approximately 200,000 miles in use, require many thousands of tons of copper. The government cable, between the United States and the Philippine Islands, is 8,200 nautical miles in length and in making required 19,000,000 pounds of iron and steel wire, and 3,600,000 pounds of copper wire. In addition to the wires, all telegraph instruments are made of heavy brass, and copper sulphate is used in enormous quantities for batteries, furnishing power for the transmission of the electric impulses.

In addition to the power, light and traction lines, and the telegraphs and telephones, copper wire is used to the extent of millions of pounds for minor electrical systems, these including messenger call systems, fire-alarm systems and burglar-alarm systems for banks and private residences. These systems not only require much wire, but also are considerable consumers of brass for their annunciators and other instruments.

Electric heating and cooking are as yet in the experimental stage, to the extent that while their feasibility has been demonstrated, their

cost remains prohibitive, in most cases. It is probable, however, th further inventions will reduce the cost to a point where the elect current will come into quite general use, for these purposes. The imm diate availability of the electric current, which may be turned on or by the mere touch of a switch, has brought about the very general use electric lighting, and will bring about as wide a use for cooking and he ing purposes, as soon as the march of invention will permit the furnishi of the current at lesser cost, for such uses.

In addition to its use for the transmission of electrical impulses energy, copper wire is utilized for other purposes, in a great number industries, though the electric trades consume more than ninety-five cent. of the copper wire that is drawn.

Brass, an alloy of copper and zinc, is one of the most useful met known to man, being the most valuable of all alloys, and probably is co sumed to a larger extent than all other alloys that are made. The gineering trades are the heaviest consumers of brass, and, notwithstandi the immense consumption of copper for electrical purposes, it is proba that the engineering trades remain the heaviest single consuming int est in the copper trade. Every modern steam engine has brass oil-cu and many have brass, gun-metal, bronze or composition copper bearin Copper and brass boiler-tubes are used in locomotives and other hig pressure boilers, and every locomotive requires a large amount of brass its trimmings. Copper tubes are used almost exclusively in marine co densers.

The ship-building trade is one of the very best customers of the co per mines. Until the era of iron vessels, prudent ship-owners sheath the hulls of their vessels with copper, which kept the bottoms clean, a within the past few years this practice has been renewed, with mode steel steamers, on which it is necessary to plank over the hull, bel the water line, in order to give a backing for the riveting-on of the co per sheets. The loss in speed, and consequent loss in time and fu brought about by barnacles gathering on iron and steel bottoms, is ve great, and this can be obviated only by dry-docking and scraping, at co siderable expense and loss of time, or by copper-sheathing below t water-line, and the latter plan is considered the cheaper. In all like hood some method will be devised, eventually, for the plating of copp directly on the steel bottoms of boats. Every modern passenger ves and warship of great size is a consumer of hundreds of tons of copper, the form of brass for engines, copper and bronze for fittings, copper a brass for dynamos and motors, and in wires for telephone, telegraph a electric light systems.

In the line of land transportation, the use of copper for roofing a sheathing passenger coaches of railroads is spreading. The undergrou railway cars in New York are sheathed throughout with copper, whi proves more durable than wood, and this utilization of the metal is like to increase steadily, as old-style cars of wooden frame give way to ste cars. The ideal passenger car of the future will have a steel frame, co per roofing and sheathing, wooden interior finish with brass fittings, a paper wheels.

Wherever there are waterworks, brass faucets and valves are found. T

consumption of brass for valves is enormous, and for very many uses these valves, while very costly in the larger sizes, prove economical in the end.

In the arts and manufactures, copper plays a highly important part. The great vacuum-pans of the sugar factories and refineries are made of copper, and there are copper vats in pulp and paper mills. The worms and stills of distilleries are of copper, and the copper brewing kettles in which beer is made are of immense size, and are numbered by thousands. There is scarcely a branch of manufacture that does not make use of copper or brass, usually to a considerable extent, in one or many of the various processes employed. In the textile trades, copper rolls for stamping patterns on print-cloths are consumers of hundreds of tons of the metal.

Perforated metal screens of brass and copper are in use in many industries, and these, while considerably higher in first cost than similar screens of iron, are more economical for many uses. Similarly, woven wire screens of brass are replacing steel wire-cloth for many uses, the first cost being higher, but the life much longer.

The automobile may be termed a strictly Twentieth Century invention, as the modern machines date from but a few years back, even though their forbears were seen, as a rarity, in the closing years of the previous cycle. An average automobile requires about 100 pounds of copper, mainly in the form of brass, for lamps, horns and other parts and accessories. The world's consumption of copper for automobiles probably reached nearly or quite ten million pounds in 1907.

The motor-boat is another Twentieth Century invention, even more recent than the automobile, and is gaining rapidly in popularity. These boats require from fifty to two hundred and fifty pounds of copper each, according to size.

In building construction, the uses of copper are extensive and increasing. Copper roofs for buildings, with the metal in either sheet or tile form, are quite common, and the use of copper for cornices is general, these having much longer life than cornices of galvanized iron. Copper is more costly, but its freedom from corrosion and its rich appearance render it desirable for ornamental trimmings and cornices on the better class of buildings. Bronze gates and doors for churches and public buildings are highly ornamental, and of practically perpetual life. Bronze grille work is in high favor, both for its rich appearance and its durability. In some recent buildings, copper sheets have been used almost exclusively for outside walls and facings, in place of brick or cut stone. The use of this metal for sheathing interior woodwork, where exposed, as in baseboards, window-sashes, doors, etc., is increasing. In the destruction of San Francisco, in April, 1906, through an earthquake shock, followed by fire, the Kohl building, an eleven-story office structure, suffered comparatively little damage, being the only tall building in the city that was not badly injured. In this building all interior woodwork was protected by sheet copper, and it was this protection that allowed the building to escape with the minimum of damage. This use of copper is certain to increase, as the severe trial imposed in San Francisco proved the value of metallic sheathing for interior wood finish, and architects and builders have been greatly impressed by the advantages of this feature of construction. The San

Francisco earthquake and fire also proved the great danger to pedestrians resulting from the use of concrete and terra cotta cornices. There is a growing use of copper for windows and sashes made from sheet metal, and one firm in Maine turns out over one million copper-wire window-screens yearly, these costing about three times the first price of steel woven wire, but proving cheaper to the user in the long run.

In builder's hardware, brass, bronze and copper locks, knobs, butts, bolts, catches and drawer-pulls are in steadily increasing favor and use, and because of the superior durability and appearance of copper and its alloys, will continue to displace iron to a greater extent, as wealth increases and the standard of living is raised. In modern office and apartment buildings and in hotels, the mailing chute, made of brass and glass, is becoming a necessity, rather than a luxury. There is a large consumption of high-grade brass pipes and castings for gasoliers and electroliers, which are rapidly displacing the crude and often semi-barbarous iron devices of the preceding generation. Brass pipes and faucets, usually nickeled, are used in the best plumbing, for bathrooms and lavatories, on both land and sea.

The domestic uses of copper and brass are numerous and varied. Brass beds and furniture attract by their cleanliness, beauty and durability. Brass rods are used in millions of homes for stair-carpets, and for the suspension of portieres and curtains. Brass or copper lamps for burning kerosene oil are more durable than those of glass and pottery, and far safer. In the kitchen, the brazen kettles of earlier days are losing ground; there is no better material in use for cooking, when carefully cleaned, and none that may cause so much trouble if neglected.

The use of copper, in the form of bronze, for statuary, dates from prehistoric times. The ancient Greeks used mainly Pentelican marble for statues, and terra cotta for statuettes, but the modern world makes its statues and bas-reliefs almost exclusively of bronze. Iron turns to rust, wood decays, and marble is mutilated and discolored, but bronze retains the beauty and finish imposed upon it by the sculptor, being subject to slight corrosion only, in the course of ages, when buried in the earth. For general decorative purposes bronze is much used for vases, urns and similar ornamental receptacles.

The best bells are of bronze, in which copper is the principal component. In addition to perhaps a million church bells, there is a considerably larger number of smaller bells, mainly made of brass, in use in practically every power plant, and in fire, burglar and messenger alarms.

Copper is used extensively for munitions of war, the largest single requirement being for cartridge cases, with small but appreciable quantities used for buttons, and for a variety of other uses. The brass cannon, so popular fifty years ago, are in the present age used mainly for firing salutes, ornamenting public squares and trading to the heathen. Notwithstanding this disuse of the metal for ordnance, except in small salute-guns for yachts, more copper is used now, for munitions of war, than ever was consumed in the casting of cannon. Brass and copper cartridge-cases, cold-stamped from tough sheets, are consumed annually, by the world's armies, to the extent of hundreds of millions, for machine guns and small arms, and to a scarcely smaller extent by hunters. Hundreds of tons of

the best tough metal are used annually, merely to make the brass buttons for decorating the uniforms of the world's armies and navies. Brass fittings and buckles for men and horses, brass canteens, drinking cups and cooking utensils, also require much copper for the followers of Mars, though aluminum, by reason of its superior lightness, is displacing copper for the smaller metallic articles required by troops. The copper exploders, used in every metal mine where modern methods are employed, afford another use, apparently trivial, yet which is one of the scores of minor demands that in the aggregate consume thousands of tons of copper yearly. The amount of the metal consumed by the world, for munitions of war, cannot be much short of ten thousand tons yearly, in times of peace, and several times as much in season of great wars.

Copper and its alloys have been employed for coinage from time immemorial. Originally copper was a purely money metal, like silver and gold, and each copper coin, unless debased by the short-sighted cunning of the petty tyrant, oligarchy or democracy of the day, represented upon its face merely the intrinsic value of the metal it contained. Eventually the inherent impossibility of keeping three separate metals upon any fixed basis of parity led to the relegation of copper to the status of token money, for the same reason that silver coins have been made merely token money, by the leading nations of the globe, during the past hundred years. The Chinese continued to give honest values in their brass money until 1904, when the possibility of debasing the coinage, to the great profit of the provincial officials, suggested itself so forcibly to the astute minds of some of the governors that several of the Chinese mints were worked with feverish activity, in turning out new copper cash, but, as invariably is the case in any debasement of coinage, the work was overdone, and much confusion and loss has been caused by the excessive issue of copper coins, in several of the provinces. In 1904 the four mints of Tientsin, Wuchang, Canton and Foochow, emitted 3,997,710 twenty-cash pieces, and 371,916,330 ten-cash pieces, consuming therefor 13,718 long tons of copper. The total amount of copper consumed for Chinese coinage, in the three years 1903 to 1905, inclusive, probably was between thirty thousand and forty thousand long tons, though possibly greater, and the coinage requirements of 1905 alone have been estimated as high as 59,000 long tons, but this, without question, is excessive. For the fiscal year 1906 the United States government consumed about 825,000 pounds of fine copper for coinage, this including the metal for bronze cents and the copper used for alloying gold and silver coins. The monetary systems of practically all civilized countries include the use of copper for the smaller coins. It is estimated that nearly £1,000,000 in copper coins is locked up, constantly, in the penny slot-machines extensively used in Great Britain for gas-meters, and for the automatic vending of many other articles. In the United States, France, Germany and many other countries, automatic vending machines are very common, and have necessitated, in all such countries, a considerable increase in the coinage of copper money, to maintain the supply of minor coins, so heavily drawn upon by the automatic machines.

Practically the entire works of a modern clock are made of brass, and in the case of the Yankee dollar clocks, now to be found in the most re-

mote corners of the earth, practically everything but the glass front and the hands are made of brass, though the case is nickeled. The gear-wheels and pinions of watches, whether of the dollar variety or of the highest grade, are made from brass, and the dials of watches also are made of brass enameled. A single firm, in the Naugatuck valley of Connecticut, stamps out one hundred thousand watch dials daily, and buys Calumet & Hecla copper in lots of five to fifteen tons therefor.

Instruments of precision used in the scientific world are composed mainly of brass. Miscroscopes and telescopes, surveyor's transits and draughtsman's protractors, and hundreds of other strange instruments, of marvelous variety and complexity, that do human work without the element of human fallibility, are composed almost exclusively of brass.

In ceramics, copper and cobalt, often found associated in nature, are the principal metals used for coloring, and an infinite variety of colors and shadings of the utmost delicacy are secured, in glassware and the higher grades of pottery, from the ores and compounds of these metals.

In the business world, the uses of copper are numerous. Signs of copper, brass and bronze stare at us from every corner of crowded city streets. Copper leaf is used by sign-writers, and in various other ways, and comminuted copper is used in bronzing. Brass rods are utilized for window displays and in various mechanisms used for exhibiting goods in retail business houses.

In offices and for clerical work, copper is consumed to an extent far beyond the wildest guess of anyone who has not given thought to the subject. Brass platens are used on typewriters, for heavy manifolding, and the best numbering and dating machines have their figures cut upon brass wheels, and brass is used in other parts of such devices. Brass wire for stapling papers is consumed extensively, as are brass paper fasteners, and the little brass clips, so easily attached to or detached from masses of papers, are used by the hundreds of millions yearly, a single set of files, of the dozen or more required by the Copper Handbook, consuming about fifteen thousand such clips in every year. Hundreds of tons of copper are consumed in the manufacture of metal tips for lead pencils, these being almost invariably of brass, with a thin plating of nickel, and for metallic tips for penholders, metallic pencilholders and miscellaneous office devices and fittings.

Practically all of the high grade American toilet preparations now are put out in glass bottles, or nickeled cans. These cans, formerly of tin, now are almost invariably of brass and copper, lightly plated with nickel. A single manufacturer of talcum powder alone used more than six million small cans for his product, in 1906.

Several thousand tons of copper are consumed yearly, in the United States alone, for the manufacture of so small but necessary an article as the pin.

A single Connecticut firm uses an average of about twelve thousand pounds of copper daily for making eyelets, bals and vamps for shoes.

Brass mountings are used extensively in the manufacture of harnesses for horses, either appearing in the natural color, or plated with nickel, silver or gold. Copper is used frequently for card cases, cigarette cases and for mounting ladies' fine pocketbooks, wrist-bags, and chatelaines,

either appearing as the natural metal, or plated. Copper is used also, to a large extent, for the heads of umbrellas and canes, and is used frequently for backing combs, brushes and mirrors.

The use of copper for ornaments is very general among all savage tribes where the metal is available, either through aboriginal production or by reason of purchase from traders. Copper wires, made from ore smelted in crude furnaces, and drawn through stone mandrels, are found in Central Africa, in the vicinity of Lake Tanganyika, and are used extensively for arm and leg bracelets, ear-rings, nose-pieces and other embellishments for the person of the untutored savage. The dark-skinned Hindoo, and the darker-skinned native of Central and Southern Africa, evince one failing in common, this being a great fondness for jewelry and ornaments made from telephone and telegraph wires, but when these are succeeded, as is commonly the case, by high voltage power transmission lines, such depredations cease, after about the third consecutive funeral. Some of the telegraph and telephone companies, operating in districts where natives are unduly fond of copper wire, have found it necessary to protect their wires by currents of sufficient voltage to give severe shocks, without causing death to wire thieves.

The uses of copper enumerated in the preceding paragraphs of this chapter are for the metal and its alloys, brass and bronze. There are other alloys, not previously mentioned, such as nickel-copper, arsenic-copper, aluminum-copper and others, that are used for a variety of special purposes.

Malachite, the green carbonate ore of copper, when found massive, is a semi-precious stone of great beauty, and is much in demand for table tops and interior architecture, and also is an exceedingly beautiful stone for brooches, pins and buttons. Chrysocolla, a silicate of copper, vies with malachite in beauty and utility, and turquoise owes its beautiful blue color to the small amount of copper contained therein. Other ores of copper are ground up for pigments, many beautiful shades, especially blue and green, being secured from mixtures having copper ores as bases.

The most important copper mineral, for other uses than the production of metal therefrom, is copper sulphate, the common bluestone or blue vitrol of commerce. This is found in nature as chalcanthite, but, as a rule, is a product of manufacture. This compound is one of the most important chemical agents known to science and the arts, and is a necessity in the electrolytic refining of crude copper. It is a component part of all wet batteries, and, as such, rings our door-bells, carries our telegrams, and is the energizing agent that permits the transmission of the human voice over the wires of the telephone. In electroplating, electrotyping and kindred industries, it is the prime factor. As an insectide it stands without an equal, dilute solutions of sulphate of copper having stayed the ravages of the phylloxera, when the vineyards of France seemed doomed. It is probable that not less than one hundred thousand tons of copper sulphate, containing a quarter of its weight in metallic copper, are consumed yearly in spraying the vines and fruit trees of Europe and America, and thus it may be said that it is to copper that we owe the sparkling wines of France, the peerless American apple and the blushing peach that reaches perfection on every continent.

The consumption of sulphate of copper is not confined to horticulture and the electrical industries, as it is used, to the extent of thousands of tons monthly, in the textile factories, in the chemical industries and in manufactures of greatly varied lines. Bluestone, for the past few years, has found a new and valuable use, as a destructive agent in eliminating the algæ from domestic water supplies, and it is asserted, apparently with reason, that the typhoid fever germ is destroyed by adding bluestone to water in the proportion of one to ten millions. A bluestone solution of one to five hundred thousand is effective in killing the larvæ of mosquitos, when young.

During the Nineteenth Ceentury the production and consumption of copper increased by more than forty-fold, and the end of the century found the metal used for nearly forty times as many purposes as were known one hundred years before. What another century may bring forth, no man can tell, but that the metal will be in strong demand, in ever-increasing quantities, for an ever-widening variety of uses, seems open to no doubt.

CHAPTER XII.

Substitutes for Copper.

For many uses copper is unrivaled, while for other uses there are substitutes of greater or less utility that may become available under certain circumstances. The displacement of copper by other materials increases, in many lines, almost in direct ratio to the increase in price of copper, but while higher prices for the metal cause considerable substitution, lower prices invariably drive the substitutes, partly or entirely, out of the field.

In building construction, for making cornices and similar uses, galvanized iron is a cheap but not altogether satisfactory substitute for sheet copper. Iron remains a competitor of copper also in the wire trade, for telegraph and telephone lines, but owing to its low conductivity is not available for power transmission.

Copper wire laid underground, and not protected by tubing, is affected by electrolysis, but to nothing like the same extent as iron, and copper wire in the atmosphere undergoes some surface oxidation from carbon dioxide and sulphur vapors, but such oxidation is merely superficial. Apparently the life of a good copper wire, in ordinary use, is of indefinite and practically everlasting duration. Iron is low in electrical conductivity, rendering iron wires an inefficient and costly medium for the transmission of electrical impulses, and out of the question for the transmission of electrical energy. Iron also is subject to rust, and its lack of the ductility that is such a strong characteristic of copper, causes iron wires to break from winds and sleets that would not injure lines of copper wire. Telegraph and telephone wires of iron remain in use to a much larger extent than generally supposed, owing to the cheap initial cost of installation, but the cost of maintenance and repairs renders it certain that iron must give way to copper, sooner or later, at practically all points in this field. Many local telephone systems are installed with iron wires, but so certainly as such installations become successful, the replacement of iron by copper wires is certain to begin. Iron wires for telegraph lines are in quite general use on branches, but the principal telegraphic trunk lines are of copper.

Metallic sodium has been tested for overheard transmission. Owing to the great affinity of sodium for oxygen, it is necessary that it be protected from the air by being run into wrought iron pipes, which in turn are protected by weather-proof paint. It is claimed that, for the same conductivity, the cost of building a sodium conductor is only about 40 to 60 per cent. that of a copper conductor, but these figures are viewed with suspicion, and while sodium may become a serious competitor of copper for power transmission, in time, the prospects of strong competition from this source do not seem alarming.

Copper has but one really formidable competitor, this being aluminum, and in view of the very considerable substitution of aluminum for

copper, in certain fields, and the threat of even more strenuous competition, serious inquiry into the subject seems warranted in a work devoted to copper.

The electrical conductivity of aluminum is 63, compared with 101 to 103 in the best grades of copper. As compared with copper, aluminum has fair electrical conductivity, but lacks tensile strength. The latter defect, however, is overcome to a large extent by the greater lightness of aluminum, its atomic weight being 27, as compared with 63.2 for copper. Aluminum does not oxidize readily in the atmosphere, but when brought into contact with iron an electroytic action is brought about that causes rapid deterioration. The use of aluminum transmission wires, where exposed to the action of salt water, is impracticable, owing to rapid corrosion, and for the same reason this metal cannot be used for sheathing vessels. Aluminum wires are claimed to be superior to copper for damp places, or for withstanding acid fumes and moisture in the air or soil, these having but slight effect on aluminum.

One of the principal defects encountered in the use of aluminum for transmission wires is found in the great difficulty experienced in making good joints, although it has been stated, repeatedly, that this trouble has been overcome. Owing to the difficulty with which joints are soldered or brazed, the connections are mainly in the form of a three-way sleeve, giving a straight joint equivalent to a straight splice. In the case of large wires, dove-tailing is adopted, and, in smaller wires, a flattened tube is used occasionally. The conductivity of aluminum transmission lines is impaired somewhat by slight oxidation at the joints.

Aluminum being much lighter than copper, the number of poles required for a transmission line can be reduced, but owing to the large coefficient of expansion, aluminum wires sag heavily in warm weather.

The principal electrical use of aluminum is found in power transmission lines. This metal having lower conductivity and considerably less tensile strength than copper, its use necessitates bars or wires of considerably larger section, which disadvantage is balanced by the much lighter weight, but wires of aluminum are much more apt than those of copper to suffer from the stresses of snow, ice and wind, because of lesser tensile strength. Aluminum cables are in use in a California transmission line that carries power for a distance of 154 miles, to San Francisco. The longest transmission line is from Niagara Falls to Syracuse, a distance of 162 miles. This latter installation includes nine aluminum cables, each containing nineteen wires, giving a total length of about 28,000 miles of wire, the cables carrying a voltage of 60,000. The general concensus of opinion among those who have used both aluminum and copper wires, for power transmission, is that aluminum is materially cheaper in first cost, but not so satisfactory in operation, being more subject to acidents, and requiring greater outlay for upkeep.

The use of aluminum in electric railway systems is limited practically to high-tension lines for feeder cables, as it cannot be used for trolley lines because aluminum will not solder or braze satisfactorily, and trolley wires require carefully soldered or brazed joints made smooth. If a satisfactory method of brazing or soldering aluminum can be invented, and this would seem probable to come in time, aluminum will become a competitor

of copper in the trolley field, on practically the same terms as the metals now compete in the field of long distance power transmission. For high-tension feeder wires on trolley lines aluminum possesses one marked advantage over copper, in that it does not melt when short-circuited, as copper does.

Although extensive tests have been made with aluminum wires for telegraph and telephone lines, these have not proven satisfactory, and the metal is but slightly used for these purposes, aluminum wires being found lacking in tensile strength. The telephone and telegraph companies prefer steel wire to aluminum, and copper wire to either.

The weight of aluminum rolled is 162 pounds to the cubic foot, and for copper, 555 pounds per cubic foot. In electrical capacity for power transmission, one pound of aluminum is nearly but not quite equivalent to two pounds of copper, hence in figuring a parity between the metals, for power transmision purposes, the base can be secured by doubling the market price of copper and comparing same with the market price for aluminum, but for the purpose of final comparison, allowances must be made for the cost of drawing the wires and further allowance made for the added expense and difficulty of securing satisfactory joints in the aluminum transmission lines.

Aluminum was given an excellent opportunity of demonstrating its capacity to replace copper, during the era of high prices of the latter metal that culminated in the market break of July, 1907, but it cannot be learned that there was any very general substitution of aluminum for copper, on account of the high price of the later metal, although advocates of the substitution of aluminum for copper claimed that with copper at 26 cents and aluminum at 39 cents there was an economy of 50 per cent. in price, and of 55 per cent. in weight, in favor of aluminum.

Aluminum is becoming a serious competitor of brass in the manufacture of light castings, but for heavier work does not seem to have made much headway as yet. The aluminum castings have superior lightness, but lack the tensile strength of brass. The principal use of aluminum castings has been made by the automobile trade, but such castings do not seem to have been entirely satisfactory to some manufacturers, although well liked by other makers. Aluminum seems to be a very satisfactory substitute for copper and brass in the making of pans, kettles and boilers for various industrial uses, such as sugar manufacturing, wax refining, fruit canning, etc., and for kitchen utensils is much preferable to copper or brass. For certain uses, such as buckles, buttons, canteens, cups and other equipments for troops, the extreme lightness of aluminum renders it preferable to brass or any other metal.

For some uses various alloys of aluminum possesses considerable advantages over the pure metal, but some of the much-touted alloys of aluminum have given results falling far short of the promises made for them. There are, however, several aluminum alloys of marked value. Alloyed with about 1.5 per cent. copper, aluminum wire gains materially in tensile strength and loses nothing in ductility, wire so alloyed permitting spans of 150 feet in length, for long distance transmission lines carrying high-voltage currents.

The present production of aluminum is only a trifle more than one

per cent. that of copper, and is about the same in tonnage as the copper production of a century ago. It is probable, however, that the production of aluminum will show a larger proportionate increase than that of copper, for the next decade.

As matters now stand, with aluminum around its present range of prices and production, it scarcely can be considered a serious competitor of copper in any single field, with the exception of long-distance power installations, but given a material decrease in the cost of production of aluminum, through improved processes which are possible, though not yet in sight, a largely increased production would be assured, as the supply of raw material is absolutely inexhaustible, and were the metal to be sold at a price corresponding to a considerably reduced cost of production, which might not be the case immediately, if the new processes were controlled by a monopoly, but would be certain to come in time, aluminum would become a competitor to be reckoned with seriously by all the other commercial metals, but the brunt of the fight would be borne by tin and copper, and probably tin would be the greater sufferer of the two, in the long run. Apparently the supremacy of copper in its leading fields is not severely threatened by aluminum, which metal will make a place for itself in the industrial world, having certain advantages that must greatly extend its present use, and certain limitations as well, which, in all probability, will operate to prevent its becoming a dangerous competitor of copper.

CHAPTER XIII.

Glossary of Mining Terms.

The following glossary of mining, milling and trade terms first appeared in Vol. II of the Copper Handbook, and has been amplified in 1903 and 1907. It will be found fairly complete.

ACICULAR. Needle-shaped.

ACID. An acid rock is one in which bases are combined with acids, forming salts. The antithesis of basic.

ADIT. A mine opening, driven from the surface into a hill or mountain, on practically a horizontal plane, only enough rise being allowed to provide for natural drainage and to allow the easy removal of cars bringing rock from the breast of the working. An adit can be driven only where the surface is mountainous or quite hilly.

ADOBE. Sun-dried brick.

AIR-BLAST. A violent explosion, caused by the escape of air compressed by the settling of the upper workings of a deep mine.

AIR-COMPRESSOR. A machine for condensing air to a pressure sufficient to actuate machinery, when delivered underground, or elsewhere, at a considerable distance.

AIR-DOORS. Owing to strong currents of air frequently found in the depths of mines, it is sometimes necessary to build a little chamber in a drift connecting two shafts, with a door at either end, to prevent extinguishment of the lamps and candles of the miners by strong air currents.

AIR-DRILL. A power drill operated by compressed air.

AIR-SHAFT. A shaft sunk solely to provide ventilation for deep workings, or an old shaft kept open solely to furnish air to the mine. Nature provides a means of ventilating even very deep mines. Two shafts, one of which is sunk on slightly higher ground than the other, will provide natural ventilation underground, when connected by a drift, the longer shaft becoming a chimney, and the shorter an inverted syphon, down which the air is sucked with great force.

ALKALI. An alkali is a lye—the opposite of an acid.

ALLOY. Two or more metals united mechanically, but not chemically, by fusion.

ALLUVIUM. Soil or broken rock deposited by the action of water.

ALTERED. An altered rock is one that has undergone changes in its chemical and mineralogical structure since its original deposition.

ALUMINOUS. A rock having aluminum as a base or prominent constituent element.

AMALGAM. A union of mercury with other metals, such as gold, silver or copper. Mercury will not amalgamate with iron.

AMALGAMATION. The process of uniting gold, silver or copper with mercury. The quicksilver is expelled later, by heat, and recovered for further use.

AMORPHOUS. Without structural form.

AMYGDALOID. A trap rock, of igneous origin and frequently of highly complex structure, the name coming from the little pits or amygdules of softer rock-material found therein. In the Lake Superior copper district the copper-bearing amygdaloids frequently show the native copper in the amygdules left by the leaching out of the softer rock originally contained therein.

AMYGDALOIDAL. Of the nature of or akin to amygdaloid.

ANALYSIS. A complete chemical test of any given substance.

ANHYDROUS. Devoid of water.

ANTICLINE. A fold of rock-strata bulging upwards, in saddle-shape. The reverse geologically of syncline.

ANTICLINAL. An anticline. Of the nature of an anticline.

ANTIGUA. In Mexico, is a mine worked by Spaniards or Mexicans at a time so remote—from 50 to 300 years—that particulars have been forgotten. Sometimes valuable.

APARTADO. Apartado de correos is Spanish for postoffice box. Usually written apartado only or abbreviated to Ap.

ANTIMONIDE. An ore of any metal chemically united with antimony.

APEX. That part of an ore vein at or nearest surface. In the United States usually requires opposing experts and several lawsuits to determine. In case of litigation, rightful title to the apex usually rests in the litigant having the most money.

APICE. Apex.

ARENACEOUS. Of a sandy nature.

ARGENTIFEROUS. Silver-bearing.

ARGILLACEOUS. Of a clayey nature.

ARASTRA. A Chilean mill. A circular trough, in which broken ore is pulverized by a revolving wheel or mill stone

ARROYA. A gulch.

ARROBA. A weight of varying heft. Spanish, 25.36 pounds avoirdupois; Portuguese, 32.38 pounds.

ARSENIDE. An ore of any metal, of which arsenic is the other constituent.

ARSENOPYRITE. An ore of any metal with which arsenic and sulphur are chemically united.

ASSAY. A chemical test of ore or metal to determine its exact content and value in any given metal or metals.

ASSESSMENT WORK. The amount of work required annually by the United States government, from the holders of an unpatented mining claim.

ATTLE. Cornish term for waste rock.

AURIFEROUS. Gold-bearing.

AUXILIARY. An auxiliary engine or machine is one kept in reserve for use when the principal machine is out of commission.

AVERAGE PRODUCE. Cornish term for percentage of copper in ore.

BACK. The roof of rock above any mine opening driven on a horizontal plane.

BAD AIR. Air in which miners cannot work, owing to powder fumes, noxious gases or insufficient ventilation.

BAL. Cornish for mine.

BALANCE BOB. A counterweight for pump rods.

BALL HEAD. A steam stamp, named after its inventor.

BALL STAMP. A Ball head.

BARRANCA. A deep gulch or cañon, with precipitous sides.

BARILLA DE COBRE. Spanish term for native copper, dressed but unsmelted. Equivalent to the "mineral" of Lake Superior mines. Used mainly in Bolivia.

BARREL WORK. Copper in small masses, detached from its rock-matrices at the rock-house, and shipped in barrels direct to the smelter.

BARROW. A wheelbarrow; also same as burrow.

BARTLETT. A Bartlett concentrating table.

BASALT. A trappean rock.

BASE. An alkaline element.

BASE BULLION. Copper or lead carrying much gold or silver.

BASE METAL. Any of the more common metals except gold, silver and platinum.

BASIC. Of an alkaline nature.

BASIN. A syncline; a trough in the earth's surface.

BATTERY. A set of gravity stamps, usually five in number.

BEARING. The bearing of a mineral outcrop is its strike.

BEATING AWAY. To cut down or stope a mineral body.

BED. A stratified rock formation. Used in some mineral districts for veins or lodes lying horizontally, or approximately so.

BEDDED VEIN. A vein parallel with the stratification of country rock.

BED ROCK. The solid rock, as differentiated from loose or surface rock. The ledge.

BELLS. Signals for lowering and hoisting the bucket, skip or cage in a shaft usually are given by bells, the number of strokes indicating the nature of the load, the place for stopping, etc.

BIT. A steel drill; a short hollow cylinder of soft steel, used in diamond drilling. The diamonds are set around the inner and outer edges of the bottom of the bit, boring the most refractory rocks when the bit is rotated.

BLACK COPPER. Copper partly smelted, but containing impurities requiring refining.

BLACK JACK. Sphalerite, zinc blende of dark color.

BLANCHED COPPER. Copper containing a large amount of arsenic, practically forming an alloy.

BLAST. (N.) Air forced through tuyeres into a blast furnace or bessemer converter. (V.) To explode gunpowder or dynamite.

BLASTED. A blasted miner is one who has been injured by the explosion of a charge of dynamite or gunpowder.

BLAST FURNACE. An oven in which ore is smelted, with the aid of air pumped in under pressure.

BLASTING. The breaking of rock by means of high explosives, inserted in holes bored in the rock for the purpose.

BLENDE. Zinc blende; sphalerite.

BLIND DRIFT. A drift connected with other workings of the mine at one end only. A cul de sac.

BLIND LODE. A lode not outcropping at surface.

BLISTER COPPER. Copper of 96 to 99 per cent. tenor.

BLOCKING OUT. Opening the ore in a mine so that it can be won merely by stoping. Properly speaking, ore is not blocked out for stoping until opened on three sides.

BLOSSOM. The outcrop of an ore body altered by weathering.

BLOW. A blossom.

BLOWER. A fan used to force air into a mine; a blowing engine.

BLOWING ENGINE. A rotary engine for forcing air into blast furnaces under an average pressure of about one pound avoirdupois per square inch.

BLOWING IN. A smelting furnace is blown in when charged and the process of reduction by fire is begun.

BLOWING OUT. A smelting furnace is blown out when the metal and slag are tapped out, and the fires are allowed to die out.

BLOWOUT. An outcrop larger than the ore-body beneath.

BLUESTONE. Copper sulphate.

BOILING SHAFT. A sand-shaft in which quicksand and water boil up from the bottom.

BONANZA. A body of exceptionally rich ore. Commonly applied to silver mines.

BONNET. The cover or roof of a cage; also a steel casting connecting the piston-rod with the upper end of a stamp-shaft.

BORE HOLE. A drill hole bored for test purposes.

BORT. A form of crystallized carbon between the diamond and the black diamond.

BORTZ. Bort.

BOTRYOIDAL. Shaped like a bunch of grapes.

BOTTOM. A mass of impure copper formed below the matte, in matting copper ores.

BOULDERS. Detached masses of rock, rounded by attrition, usually found at or near surface, in alluvial deposits lying above rocks in place.

BOX CAÑON. A cañon closed at one end.

BRANCH. A vein branching off from the main ore body.

BRATTICE. A screen for the regulation of air currents in a mine.

BREAST. The face or working end of a drift, stope or adit.

BRECCIA. A conglomerate rock, in which angular fragments of rock are cemented together.

BRECCIATED. A rock stratum made up of sharply broken fragments, partially or wholly cemented together.

BROKEN. A vein is broken when lacking clearly defined walls or characteristics of regularity.

BROKEN GROUND. Rock strata where the walls are poorly defined and the general formation unsettled.

BROOD. Cornish for waste ore, such as mundic or zinc blende, when found in connection with copper ores.

BUCKET. A kibble. An iron or steel bucket used for hoisting in a mine. In a vertical shaft a bucket swings free in ascending and descending, but in an incline shaft the bucket runs on a skidway of plank timbers, or ride a trolley cable.

BUDDLE. A conical table on which ore is dressed. Machine and name both growing obsolete.

BULKHEAD. A wooden or masonry partition walling off a mine opening, or protecting mine sets against soft or creeping ground.

BULLION. Refined gold or silver. Sometimes erroneously applied to copper.

BULLION BARS. Unrefined gold and silver secured by melting the precious metals precipitated to the bottom of the tank in the electrolytic refining of argentiferous and auriferous copper anodes.

BUNCH. A pocket of exceptionally rich ore.

BUNCHY. An ore body given to considerable variations in width or values, or both.

BURDEN. Overburden.

BURROW. A rock burrow.

CABLE. The steel wire rope used in shafts for hoisting buckets, skips or cages.

CAGE. The elevator used in vertical shafts for hoisting mineral and for lowering men, timber, etc.

CAKES. Copper cast in the form of cakes.

CALCAREOUS. Of a limey nature.

CALCINE. To drive off sulphur or other volatile constituents of an ore by heating.

CALCINER. A calcining furnace.

CALCINING FURNACE. A furnace for roasting ore to drive off sulphur, previous to smelting.

CALCITE. Crystals of calcium carbonate.

CAM. A curved tooth, fixed on a shaft, for lifting the pistons of gravity stamps.

CAMP. A mining town.

CAÑON. (pronounced canyon). A deep gorge with precipitous walls.

CANYON. A cañon.

CAP. The top piece of a framed set of mine timbers; copper caps containing fulminate of mercury, used to explode dynamite in blasting rock.

CAPPING. The rock or other ground overlying the mineral body of a mine.

CAP-ROCK. Capping.

CAPTAIN. In most mining fields where Cornishmen are found, the man in charge of mining work is termed a captain. The mining captain is the executive officer underground.

CARBONACEOUS. Of the nature of coal; containing carbon.

CARBONATE. An ore of any metal or metals with which carbon and oxygen are chemically united.

CARBONATES. A term commonly applied, in the western part of the United States, to ores containing a considerable proportion of lead carbonates, usually argentiferous.

CARBONIFEROUS. Rocks of the geological ages usually associated with coal measures.

CARGA. A Mexican weight equalling 300 pounds avoirdupois.

CARTRIDGE. Dynamite put up in cylindrical cases of oiled paper to fit the holes bored by drills.

CASING. The wooden lining of a shaft; an iron pipe put down outside of a diamond drill hole when passing through soft or broken ground, to prevent the hole becoming clogged by matter intruding from outside.

CASTING COPPER. Impure copper better suited for casting into various forms than for drawing into wires or rolling into sheets.

CAVE. A natural opening or "vug" in a rock formation; the partial or complete falling in of a mine.

CAVING SYSTEM. A plan of mining, by which the worked out upper levels and surface are allowed to subside gradually, as the mine workings are deepened.

CEMENT COPPER. Regulus. The impure metal obtained from ores by leaching processes.

CERRO. Spanish for a hill showing rock outcrops.

CHAMBER. A large stope.

CHAPEAU DE FER. French for gossan or iron hat.

CHARGE. The amount of ore, flux and fuel required for one filling of a furnace.

CHIMNEY. An ore body of pipe shape in an approximately vertical position.

CHERT. A coarse flint containing calcium.

CHILEAN MILL. An arastra.

CHILE BARS. Bars of Chilean blister copper, weighing about 200 pounds each.

CHLORIDE. The ore of any metal united chemically with chlorine.

CHLORIDES. Commonly applied, in the western part of the United States, to chloride ores of silver.

CHURN DRILL. A drill having a churning motion, used for boring test-holes, or wells.

CHUTE. A section of a lode or vein differing by being much richer or leaner than the average; also a trough for dropping ore or waste to lower openings in a mine.

CIRCA. Approximately.

CLACK. A pump valve.

CLAIM. Public land staked off and claimed by a prospector or miner. Size of claims varies in different countries.

CLAY COURSE. A seam of clay between vein and wall.

CLAY PARTING. A clay course.

CLAY SLATE. An argillaceous slate.

CLEAN-UP. The cleaning up of accumulated ore or metal in a mill or smelter.

CLEAVAGE. The parting of rock along more or less regular lines of least resistance.

CLEAVAGE PLANES. The lines along which rock cleavage occurs.

COARSE JIGS. The jigs used to handle the heavier grades of ore or metal.

COARSE METAL. Matte resulting from the first smelting.

COBBING. Breaking masses of ore into lumps by hand hammers.

COLLAR. The top of a shaft; the surface timbering of a shaft.

COMPANY ACCOUNT. Miners and other underground employes working on fixed wages per shift or month usually are called "company 'count men" to distinguish them from miners working on contract.

COMPARTMENT. Mining shafts usually are divided into two or more compartments, separated by framed timbers and planking.

CONCENTRATES. The concentrated ore or metal, after partial or complete elimination of gangue rock.

CONCENTRATION. The process of separating native metal or ore from its gangue of worthless rock.

CONCENTRATING TABLE. A concentrator.

CONCENTRATOR. A plant where ores are concentrated; a jig, or machine for separating ore or metal from gangue-rock, the process usually employing a rocking or oscillating motion, aided by jets of water, whereby

the worthless gangue is driven off and the heavier mineral retained by specific gravity.

CONCHOIDAL. A fracture resembling in form the shell of a bivalve mollusk.

CONCRETIONS. Nodules formed by aggregation of mineral matter.

CONDUCTIVITY. Electrical conductivity is measured by the resistance offered to the passage of an electrical current.

CONGLOMERATE. A rock stratum formed of pebbles and rounded boulders cemented together. Sedimentary conglomerates are ancient seabeds; volcanic conglomerates are called tuffs, and consist of scoriaceous matter ejected from volcanic vents and cemented to rock, under pressure.

CONSTRUCTION ACCOUNT. Many of the Lake Superior copper mines summarize their finances so that the cost of operation is divided into two classes, one being for general working expenses and the other for construction account. The latter includes new buildings and machinery on surface, and frequently new mine openings. In effect the construction account of a mine is like the stock account of a merchandise firm, and sometimes, like charity, "covers a multitude of sins."

CONTACT. The junction of two dissimilar bodies of rock.

CONTACT VEIN. A mineral body found between two unlike rock strata.

CONTORTION. The distortion of a rock body.

CONTOUR. The outline or configuration of any given tract.

CONTRACT. Many miners work on contract, agreeing to sink, drift or stope at a fixed price per running foot, or per fathom. These are known as contract miners, and are usually the more skilled workmen.

COPPER ORE. See detailed descriptions of copper ores and copper-bearing minerals in chapter on chemistry and mineralogy.

CORE. A drill core.

CORNISH PUMP. A form of mine pump actuated by long rods reaching from surface down the shafts.

CORNISH STAMP. A gravity stamp, in which the heads are raised by cams and dropped by gravity.

COST-BOOK SYSTEM. A plan of mine operation, used in Cornwall only, by which shares are subject to unlimited assessment. A sort of unlimited partnership.

COSTEANING. Proving an ore body by trenching across its outcrop at approximately right angles.

COUNTERBALANCE. Hoisting plants usually are worked in counterbalance for deep shafts. The weight of the descending cage or skip is used to partially offset the weight of the ascending cage or skip.

COUNTER VEIN. A cross vein, running at approximately right angles to the main ore body.

COUNTRY ROCK. The predominant rock form of a given district.

COURSE. The direction or strike of a mineral body; a stretch of mineralized matter in an ore vein.

CRAB. A hand winch.

CREEPING. The movement caused in mines by the pressure of superincumbent and adjacent rock masses.

CRETACEOUS. Of a chalky nature; limestone of a certain geographical horizon.

CRIBBING. The lining of a shaft; frameworks of timber to support an underground roof.

CROPPINGS. Outcrops.

CROSS COURSE. An intersecting vein.

CROSSCUT. An opening similar to a drift, except that the crosscut is sent at approximately right angles to the formation, while a drift follows the trend of the lode or vein.

CROSSCUT TUNNEL. A tunnel driven at approximately right angles to the ore body.

CROSS VEIN. An intersecting vein.

CRUCIBLE. A vessel of refractory material, used to contain ores and metals for assaying or smelting.

CRUSHER. A rock crusher.

CRYSTALLINE. Showing crystals.

CRYSTALLIZED. Having plainly defined crystals.

CRYSTALS. Geometrical forms, with plane faces, of infinite variety, assumed by the majority of minerals.

CUPOLA. A furnace in a smelter.

CUPRIFEROUS. Copper-bearing.

CUT. To intersect an ore body; the portion of a working face of mineral removed at one operation.

CUTTING DOWN. To enlarge a shaft.

CWT. A hundredweight, or 112 pounds avoirdupois.

DAM. A masonry barrier, built underground, to hold back water.

DATUM LEVEL. The level (usually sea-level or mean level of nearest considerable body of water) from which altitudes are measured in surveys.

DEAD ROASTING. Sulphide ores are dead roasted when all the sulphur possible to drive off by roasting has been eliminated.

DEAD WORK. The opening of new shafts, drifts and winzes, preliminary to the stoping of the mineral bodies.

DEBRIS. Broken down rock material.

DECOMPOSED. Rock or ore broken down by elemental action.

DECREPITATE. To break into fragments with violence, under the blowpipe or great heat.

DENDRITE. A mineral crystallized in form similar to the branch of a tree.

DENOUNCEMENT. In Mexico, the formal filing of a claim to mineral land.

DENUDATION. The uncovering of rock strata by the weathering of wind or water, or both.

DEPOSIT. A term, loosely used, meaning a mineral body.

DERRICK. A mast, freely rotatable, carrying a boom or yard-arm, at the end of which is a sheave-wheel. In mining is used mainly for open pit work.

DESSICATION. The drying out of water from any given substance.

DETRITUS. Debris. Broken down rock.

DEVELOPMENT WORK. Dead work.

DIAMOND DRILL. A machine for boring holes in rocks, taking its name from the black diamonds or bort used to form cutting surfaces on the inner and outer edges of the hollow cylindrical bit.

DIE. The iron block in the mortar, onto which the ore is fed for crushing under the stamp.

DIORITE. Greenstone; a crystalline spathic hornblende.

DIP. The angle at which a lode or vein descends from the earth's surface.

DIP COMPASS. A compass having the needle fixed to swing in a vertical plane.

DIRT. Frequently used to designate ore broken underground.

DISINTEGRATION. The breaking down of rock forms, usually through weathering.

DISSEMINATED ORE. Ore found scattered through a gangue of valueless rock.

DISTURBED. An ore body is disturbed when lacking defined walls and settled character.

DOLLY. A crude prospecting stamp set on a spring pole.

DOLOMITE. Magnesian limestone; carbonate of calcium and magnesium.

DONKEY HOIST. A small auxiliary hoisting engine, usually operated underground and actuated by compressed air, or used for preliminary work at new shafts or exploring pits.

DOWNCAST. A shaft having a downward air current.

DRAFTAGE. An arbitrary allowance claimed by some British smelters, to cover loss of weight in transport.

DRESS. To separate ore from gangue rock by hand or machinery.

DRESSING FLOOR. A floor or dirt surface where ore is dressed by cobbing and other hand-work.

DRIFT. A horizontal opening in a mine, following the direction of the lode or vein; loose alluvial matter, such as sand, pebbles and boulders.

DRIFT COPPER. Native copper found in alluvium, far from its original rock matrice, whence carried by glaciers.

DRIFTING. Opening drifts. Driving.

DRILL. A steel bar for boring in rock, having a single sharp cutting face, or two cutting faces crossed at right angles.

DRILL-CORE. Solid, cylindrical cores of rock, are cut by the operation of the diamond drill. These are raised to surface and form a valuable permanent record of the strata through which the drill has passed.

DRILL HOLE. A hole bored by a drill.

DRIVE. A drift.

DRIVING. Drifting.

DROP SHAFT. A shaft, usually of heavy framing sunk by weight, through sand or similar material.

DRUM. The cylinder of a hoisting engine, around which the cable winds.

DRUSE. A vug.

DRY ORE. Argentiferous lead ores containing insufficient lead for fluxing in a smelter.

DUCTILE. That which is capable of being extended in length by tension.

DUCTILITY. The capacity of a metal to elongate, when under pull from the ends, without cracking or breaking.

DUMP. A place for depositing rock taken from a mine. An ore-dump contains good mineral, and a waste-dump the worthless rock hoisted from underground.

DYKE. A fissure in the rock formation, usually transverse, filled with igneous matter. When mineralized, dykes are called cross or counter veins.

DYNAMITE. Nitro-glycerine absorbed by wood pulp, infusorial earth, or some similar article, to render it safer in use. Power varies greatly according to percentage of nitro-glycerine contained.

EISENER HUT. German for iron hat, or gossan.

EECTRIC DRILL. A power drill operated by an electric current.

ELECTROLYTE. The solution in which electrolytic separation of metals is carried on.

ELECTROLYSIS. The separation and redeposition of metals by electrolytic action.

ELECTROLYTIC. Term applied to copper means copper gained from impure metal by electrical decomposition and redeposition, whereby the copper is taken from an impure bar and redeposited in a pure form at the opposite pole of the battery, while other metals are precipitated to the bottom of the solution in the tank in which the work is done.

ELVAN. Cornish name for the dyke rocks of Cornwall, usually greenstone or porphyrite.

EROSION. The wearing away of surface masses of rock and soil by the elements, or by glacial action.

ERUPTIVE. Rock matter deposited in molten form by volcanic action.

ESCARPMENT. A rock wall, nearly or quite vertical.

EXFOLIATION. The separation of thin leaf-like layers from the main body.

EXPLODERS. Fulminating caps, for setting off high explosives.

EXPLOITATION. Development work and production.

EXPLORATION. Prospecting work.

FACE. The breast of a drift. A face of ore is the ore shown at the working end of a drift or stope.

FAHLBAND. A banded crystalline rock, carrying finely disseminated ores.

FALL OF GROUND. Rock falling from the roof into a mine opening.

FALSE SET. A temporary set of timber.

FAN. A machine for forcing air into a mine.

FATHOM. Six feet. In stoping, a fathom is a cube of six feet.

FAULT. Dislocation of a rock stratum by which continuity is lost.

FEE. The ownership of land in fee-simple.

FEE-OWNER. The owner of land in fee-simple.

FEEDER. A branch ore vein.

FERRUGINOUS. Carrying iron.

FILLING. Occupying old stopes or chambers with waste rock; allowing a mine to fill with water.

FINES. The finer ore or metals saved in concentrating processes.

FINISHER JIGS. The jigs used to save the fine ores or metals in a concentrator or stampmill.

FIRE. The miner's warning cry when a blast is to be set off, is "fire."

FISSLE. That which easily may be split.

FISSURE. Rock matter deposited at a later period, in a crack in the original rock.

FISSURE VEIN. A fissure, containing ore, usually disseminated in a worthless gangue.

FLAKE COPPER. Very fine scales of native copper.

FLEET-GEAR. A compensating device for taking up slack and paying out rope where a hoisting system is worked in counterbalance. Several turns of the cable are taken around each drum of the hoist, and the bight of the cable is carried to the rear and around a large sheave-wheel lying horizontally and traveling on trunnions, allowing the taking up or paying out of the cable.

FLOAT. A particle or boulder of ore or rock, dissociated from its matrix.

FLOAT COPPER. Drift copper.

FLOAT ORE. A detached ore mass found at a distance from its matrice.

FLOOR. The floor of a drift or other horizontal mine opening; the underlying rock stratum.

FLOUR COPPER. Very fine native copper that floats on water and is very difficult to save in milling.

FLUCCAN. A seam of clay, found in ore bodies, or more frequently, between the ore and walls of country rock.

FLUKAN. Fluccan.

FLUME. A launder or pipe line for carrying water.

FLUX. Any mineral used in the furnace to aid in fusing the gangue rock and worthless elements, which combine with the flux to form slag.

FLUXING ORE. An ore containing appreciable metallic values, but smelted mainly because containing fluxing agents required in the reduction of richer ores.

FOLIATED. Having a laminated structure.

FOOT. The foot-wall.

FOOT-WALL. The stratum of rock underlying an inclined mineral lode or vein.

FORK. To pump water from a mine; the branching of a vein.

FORMATION. A term used to imply the general geological conditions of a given district.

FOSSICKING. Extracting ore from old mines or waste-burrows.

FOUNDERS SHARES. The few shares necessarily issued to individuals organizing a stock company. In case of companies owned outright by other companies, founders shares are issued to as many individuals as are required to incorporate and hold the offices required for corporate management, as the laws do not permit a corporation, which is an artificial person, to form another corporation, or to serve as a director of another corporation.

FRACTURE. A break.

FREE. A metal is free when virgin or native, and not combined chemically with any other element.

FREE MILLING. A metal or ore that is separated readily from its accompanying rock by mechanical means.

FREEZE. A furnace freezes when the heat falls sufficiently to permit the molten charges to solidify.

FRIABLE. That which may be pulverized easily.

FROZEN. A furnace is frozen when its molten charge solidifies.

FURNACE. An oven for the smelting of ore.

FUSE. A cotton cord with a gunpowder core, so made as to carry fire to an explosive placed for use.

FUSIBLE. That which may be melted.

FUSION. Melting. Alloying metals while liquid, through heat.

GRABBRO. A rock composed mainly of plagioclase feldspar.

GAD. A small wedge or chisel.

GALENA. Lead sulphide, frequently found associated with sulphide copper ores.

GALLERY. A drift.

GALLOWS FRAME. A framework over the mouth of a shaft, carrying a sheave-wheel, over which the hoisting rope passes to the engine.

GANGUE. The foreign rock matter in which ore or metal is dis inated, the gangue rock being mechanically and not chemically united the ore or metal.

GASH VEIN. A shallow fissure vein, rapidly narrowing to extinc

GEODE. A hollow nodule of rock.

GEOLOGICAL HORIZON. Geological age.

GEOLOGY. The science of the formation of the earth.

GIANT POWDER. Dynamite.

GLACIATION. The erosive effect produced by glaciers.

GLANCE. Any metallic sulphide showing a bright, shining sur Copper glance is chalcocite.

GLORY HOLE. A large open pit from which pay ore is or has bee tracted.

G. M. B. "Good Merchantable Brands"—an English grade of re copper. Term becoming obsolete.

GNEISS. A banded, slaty granite.

GOB. Mud above a mine; refuse in worked-out openings.

GOPHERING. Prospecting work confined to digging shallow pit starting adits. Term used from similarity of this work to the cro little holes dug in the soil by gophers.

GOSSAN. Iron hat. A rock capping, usually quartzose, showing low to reddish brown iron stains, from disseminated limonite or hema Frequently is found overlying veins of copper ore.

GRADE. The percentage, or value, of ore bodies and partly re metals; the percentage of rise in roads or mine openings driven on an proximately horizontal plane.

GRANITE. A dense, granular rock, composed of varying proport of quartz, feldspar and mica.

GRANULATED. In the form of grains.

GRASS ROOTS. At surface.

GRAVITY STAMP. A stamp, usually set in batteries of five, in w the piston is raised by a cam, the stamp crushing the charge in the tar by its weight, when allowed to fall.

GREENSTONE. Diorite, or gabbro.

GRIZZLY. A grating of heavy iron or steel bars, through which the smaller pieces of rock or ore.

GROSS TON. A long ton of 2,240 pounds avoirdupois.

GROUNDSILL. The bed-piece of a set of mine timbers.

GUIDES. Perpendicular wooden stringers for guiding cages in ver shafts.

GUT. To rob.

HACIENDA DE BENEFICIO. Spanish for milling plant.

HACIENDA DE FUNDICION. Spanish for smelter.

HADE. (American). Dip of a vein from the zenith. (English). Dip of a vein from the horizon.

HALVAN. Cornish for refuse copper ore.

HANGING. The hanging-wall; the stratum of rock overlying an inclined mineral lode or vein.

HARDHEAD. A lump of partly smelted ore, carrying high percentages of refractory elements, such as iron, antimony and arsenic.

HAT. The capping of a mineral body.

HAULAGE PLANT. A mechanical installation for the underground tramming of rock, operated by ropes, compressed air or electricity.

HEAD. Water pressure.

HEADGEAR. A building, or framework, fitted with sheaves, over the mouth of a shaft.

HEAP-ROASTING. Burning the sulphur out of ores piled in heaps, with a small amount of wood or other fuel.

HEAVE. A fault. The rolling out of line of dip by a lode in making depth.

HEAVING. Rolling.

HECTARE. A metric measure of area equalling 2.471 acres.

HECTAREA. Spanish for hectare.

HOIST. An engine for raising ore from a mine, and for lowering men and material thereinto.

HOISTER. A hoist.

HOLE. Any opening in the ground; a hole drilled for explosives.

HOLING THROUGH. A drift or other mine opening is holed through when a connection is made between two separate sections working toward each other.

HORIZON. The sky-line, commonly used in the sense of absolutely flat, as shown by a spirit level. Geologically, all rock strata of the same geological period.

HORSE. An intrusion of country rock into a mineral body; sometimes used as synonymous with dyke.

HORSEPOWER. One horsepower is rated as equivalent to raising 33,000 pounds avoirdupois, to a height of one foot in one minute.

HORSE-WHIM. A windlass operated by horse-power.

HOT BLAST. Heated air supplied to a blast furnace.

HUEL. Wheal.

HUNGRY. Nearly or quite barren of mineral value.

HUNTINGTON MILL. An improved Chilean mill.

HYDRATED. Containing water of crystallization.

HYDRO-METALLURGY. The reduction of ores by wet processes.

HYDROUS. Containing water of crystallization.

IGNEOUS. Of volcanic origin.

IMPREGNATED. Containing ore. Properly used in referring to country rock carrying mineral similar to that in the vein.

INCH. One-twelfth of a foot. See Miner's inch.

INCLINATION. The dip of a vein from the horizon, measured in degrees.

INCLINE SHAFT. A shaft sunk at any except a vertical angle with the horizon.

INCRUSTATION. A solidified coating, usually crystallized.

INFILTRATION. The deposition of a mineral matter from percolating waters.

INGOT. A mass of metal cast in a peculiarly formed mold; applied only to gold, silver or copper. Iron and lead are cast in pigs.

IN PLACE. Rock matter in the position where deposited by nature.

IN SITU. In place.

INTAKE. The opening for water to enter a pipe or flume.

INTRUSIVE. Igneous rock masses pushed up through other and older rock formations.

IRIDESCENT. Showing the colors of the rainbow.

IRON HAT. Gossan.

JACK. A miner's name for sphalerite. Is called black jack, ruby jack or rosin jack, according to color.

JIG. A machine for concentrating ore or mineral by means of oscillatory or vibratory motion, aided by jets of water, separation of the ore from its gangue being effected by utilizing the greater specific gravity of the former.

JIGGER. A crude jig.

JIGGING. Concentrating ore by the use of a jig.

JUMP. To take possession of mineral lands held or claimed by another party.

JUMPER. A churn drill; one who jumps a mineral claim.

JUNCTION. The uniting point; the point of contact between dissimilar rock forms.

KEWEENAWAN. Pertaining to or of the Keweenaw formation, in which the Lake Superior copper mines are opened.

KIBBLE. A bucket used for hoisting material in a shaft.

KILLAS. Clay slate or shale.

KILO. A kilogram.

KILOGRAM. A metric weight of 2.2046 pounds.

KILOMETER. A measure of distance equalling 0.621376 miles. For rough computations may be figured as five-eighths of a mile.

KIN. A Japanese weight of 1.31 pounds avoirdupois.

KINDLY. The appearance of rock carrying or promising to carry good mineral values.

LADDER ROAD. A ladderway.

LADDERWAY. The series of ladders giving ingress and egress to a mine shaft; the compartment in which the ladders are.

LAGGING. Timber, usually of small diameter, placed over the cap-timbers of incline shafts and drifts, to prevent damage from falling rock.

LAMINA. A thin plate. Plural is laminae.

LAMELLAR. In thin sheets of laminae.

LAMINATED. Lamellar.

LANDER. The man at the mouth of the shaft, who receives signals from below, and attends to the unloading of rock sent up in buckets, skips or cages.

LAUNDER. A wooden flume or sluice, used to convey water, or tailings held in solution in water.

LAVA. Rock formed of flows from volcanoes.

LEACH. To dissolve minerals from ore by water, or acid, or both.

LEACHING. Lixiviation.

LEAD. A mineral body; the metal.

LEADER. A small vein running to a larger one.

LEDGE. The solid rock where encountered at or nearest surface.

LEG. An upright timber supporting the cap of a set of timber.

LEG-PIECE. A leg.

LENSE. An ore body of lenticular form.

LENTICULAR. Having the shape of a double convex lense.

LEVEL. A horizontal opening in a mine. Levels commonly are opened at stated intervals as depth is gained—usually at 100 feet in modern mining practice. The word "level" frequently is used interchangeably with the word drift, but is more comprehensive. Both drifts and crosscuts may be opened on a level, but a crosscut is not a level.

LIGNEOUS. Of a woody nature.

LIMESTONE. Calcium carbonate.

LIXIVIATION. The process of leaching out mineral values from ores.

LOCATE. To make formal claim to public mineral lands.

LOCATION WORK. Labor required by law to be done on mining claims when located.

LODE. Variously used in different mining fields. In Lake Superior refers to the mineralized stratified beds. Is used locally, in many fields, as synonymous with vein. Sometimes is used as meaning an aggregation of mineralized veins.

LONG TON. A gross ton of 2,240 pounds avoirdupois.

LOW GRADE. Carrying mineral values but sparingly.

MAGMA. An originally molten mass of rock coming to the earth's crust from depth.

MAGMATIC. Of the nature of or pertaining to magma.

MAGMATIC SEGREGATION. The process by which the different constituents of molten rock masses crystallize at varying temperatures,

with a tendency to separate themselves, so far as circumstances allow, from the other compounds.

MALACATE. A whim with vertical drum used for hoisting in Mexico. Sometimes is called a Zacatecas malacate.

MALLEABLE. That which may be made to change form, without fracture, under a hammer.

MAN-CAR. A skip-truck having tiers of circus seats, used for carrying miners to and from work in mines operating deep inclined shafts.

MAN-ENGINE. An appliance for raising and lowering miners in deep incline shafts. Consists essentially of two long beams, worked in counterbalance and having platforms at stated intervals.

MASS. A solid chunk of native metal.

MASSIVE. Rock without defined lines of cleavage; ore occurring without appreciable gangue, as contradistinguished from ore disseminated throughout a gangue.

MATRICE. The rock surrounding an imbedded object, such as a particle or mass of ore or native metal.

MATRIX. Matrice.

MATTE. Regulus. A product between sulphide copper ore and blister copper, varying greatly in the percentage of metal contained. Is obtained by eliminating more or less sulphur and other elements from sulphide copper ores.

MATTING. The process of converting sulphide ores into matte.

MATTOCK. A miner's pickaxe.

MESA. Spanish for a tableland or plateau.

MESH. The size of openings in a screen.

METALLIFEROUS. Carrying metal.

METALLURGY. The science and practice of reducing metals from ores and minerals.

METAMORPHIC. Rock that has been metamorphosed.

METAMORPHOSIS. The process by which changes in structure are effected in a rock form by heat or percolating waters.

METER. A metre.

METRE. A linear measure of 39.37 inches.

METRIC TON. A weight of 2,204.6 pounds avoirdupois.

MILLING. Dressing ore in a mill; also running ore in a mine through a winze for loading into tram-cars or wheelbarrows on a lower level than the one where broken.

MILL RUN. A mill test.

MILL TEST. The determination of the metallic contents and recoverable values in any given ore by the milling of a sufficient quantity to afford average milling conditions.

MINE. An open pit, or underground opening or openings, from which mineral values are extracted.

MINER. In strict construction, the man that does the drilling and blasting in a mine. In a broader sense, all men working underground.

MINERAL. Ore or rock containing metal. In the Lake Superior district the term mineral has a special use, being employed to designate the native copper, with its adhering gangue of amygdaloid or conglomerate rock, as it comes from the mill, before going to the smelter.

MINERAL BELT. The mineralized territory in a given formation or district.

MINERAL DE COBRE. Spanish for copper-matte.

MINERALIZED. Carrying metalliferous values.

MINERALOGY. The science of minerals.

MINERAL RIGHT. The ownership of the right to mine under the surface of land owned by another holder. Mineral rights sometimes are reserved in selling the surface of land in some districts.

MINERS INCH. The amount of water that will flow through an opening one inch square under a six-inch head, which is 2,274 cubic feet in 24 hours, or 94¾ cubic feet per hour, equal to 655 wine gallons or 593 imperial gallons hourly.

MINING ENGINEER. Any man having sufficient ability to pass intelligently upon mineral values, and to open and operate a mine, whether such ability was gained in a school or by practical experience. Graduates of technical mining schools usually are given the degree of engineer of mines and sign the letters E. M. after their names. The letters M. E. stand for mechanical engineer, when given by a school, but are often used by men engaged in mining, who lack scholastic degrees, as an abbreviation for mining expert.

MISSED HOLE. A drill hole, charged with explosives which fails to be set off by the fulminating cap.

MOIL. A steel bar, like a drill, except that it is sharpened to a point instead of having a cutting face.

MOLDS. Copper cast in molds.

MOMME. A Japanese weight equal to 3.75 grams or 2.4113 pennyweights.

MONOCLINE. A specific portion of the earth's crust in which the strata have a practically uniform dip.

MORAINE. A mass of boulders and detrital material marking the limits of a former glacier.

MORTAR. An assayer's mortar in which rock or ore is crushed with a pestle; a mortar-box.

MORTAR-BOX. The iron box under the stamps, into which ore or rock is fed for crushing.

MOUTH. The opening, at surface, of an adit, tunnel or shaft.

MUCKER. A trammer.

MULLOCK. Australian for waste-rock broken underground.

MUNDIC. Pyrite.

NATIVE. A virgin metal—not an ore.

NICKELIFEROUS. Carrying nickel.

NODULE. A small mineral mass of approximately spherical form.

NON-CONFORMABLE. Rock strata not associated originally in the position now occupied.

NUGGET. A lump of native metal. Term usually applied to gold.

OPEN-CAST. A mine worked as a quarry, without underground openings.

OPEN CUT. Open cast.

ORE. A chemical union of one or more metallic elements with other elements, usually non-metallic, of which oxygen, carbon and sulphur are the most frequent. For the various ores of copper, see chapter on chemistry and mineralogy.

ORE CAR. A mine car for carrying ore or waste rock.

ORE CHUTE. A specific portion of an ore vein carrying increased values. Usually has a vertical or diagonal dip on the plane of the dip of the ore body.

ORE DUMP. A dump for ore.

ORE SHOOT. An ore chute.

ORTHOCLOSE. Silicate of potassium and aluminum. An acid feldspar.

OUTCROP. The ledge of a lode or vein that is exposed on the surface of the earth.

OUTLIER. An isolated rock or group of rocks lying at a distance from the main body, and separated therefrom, on the surface of the earth, by a different rock formation.

OUTPUT. Production.

OVERBURDEN. Superincumbent material, usually drift or alluvium.

OVERHAND STOPING. Removing ore in ascending steps.

OXIDATION. Process of conversion of other minerals into oxides by weathering, or by the chemical effects of underground waters.

OXIDE. An ore of any metal or metals chemically united with oxygen.

OXIDIZE. To unite with oxygen. Many minerals and most metals oxidize with greater or less rapidity when exposed to air or water.

PARE. Cornish for a gang or shift of miners.

PARTING. The separation of two or more metals mechanically admixed by electrolysis, cupellation, use of acids or other chemical or metallurgical processes; a fluccan.

PASS. A winze.

PATENT. Direct title, from the government, to mineral lands.

PATIO. A walled yard with paved floor where finely crushed argentiferous ore is amalgamated.

PAYSTREAK. A portion of a vein or mineralized bed carrying workable values, occurring on either wall, or, occasionally, in the center of the mineral body.

PENTHOUSE. A shed-roof erected in the bottom of a shaft, when sinking, to protect miners from accidental fall of rock, timber or tools from above.

PENTICE. An erroneous spelling of penthouse.

PEROXIDE. The oxide of any metal containing the greatest proportion of oxygen.

PERPENDICULAR SHAFT. A shaft sunk vertically.

PERTENENCIA. One mineral claim in Mexico; area, one hectare, or 2.471 acres.

PETERING. Pinching.

PETER OUT. To pinch out.

PETROLOGY. The science of rocks.

PHOSPHATE. An ore of any metal or metals with which phosphorous and oxygen are chemically united.

PICK. A pick axe.

PICUL. A Chinese weight of 133 1-3 pounds.

PILLAR. A section of rock or ore left in place to support shafts or roofs.

PINCHING. The narrowing of a vein.

PINCHING OUT. The narrowing of a vein to extinction.

PIPE VEIN. An ore body of chimney form, deposited in the vent of an extinct volcano.

PIT. An opening in the earth's surface, usually shallow.

PITCH. Synomymous with "dip," but occasionally used to designate the angle of decline from the horizon, measured along the strike of the lode or vein.

PLAIN. A flat, champaign country.

PLANE. A level surface bounded by straight lines.

PLANT. The machinery equipment of a mine or reduction works. In general use the term includes buildings housing machinery.

PLAT. The enlargement of a shaft at a level, to give extra space for loading and unloading the cage, skip or bucket.

PLATEAU. An elevated plain.

PLUMBIFEROUS. Carrying lead.

PLUTONIAN. Plutonic.

PLUTONIC. Rock strata of volcanic origin.

POCKET. Underground, an ore deposit, usually of small extent. On surface, a bin at shaft-house or mill, in which ore, flux or fuel is stored.

POCKETY. Carrying only occasional bunches of good ore.

POLING. The process of adding carbon to a charge of molten copper in a reverberatory furnace by stirring with long poles.

POLL-PICK. A tool having a pick on one end, and a poll, or hammer head, on the other.

POOD. A Russian weight of 36.112 pounds avoirdupois.

POPPET-HEAD. Framework over a shaft for a sheave-wheel.

PORPHYRITIC. Of the nature of porphyry.

PORPHYRY. Like charity, covers a multitude of sins, and quite commonly is used to describe any crystalline rock. Properly, is any crystalline rock showing larger crystals upon a ground-mass of smaller crystals. Porphyry may be granite, quartz or one of several other rocks.

POUND. The troy pound is used for gold, silver and platinum only, the avoirdupois pound being used in weighing the other metals and other commodities in English-speaking countries.

POWER-DRILL. A machine for drilling holes in rock, actuated by compressed air, steam or electricity.

PRILL. Cornish for selected ore secured by cobbing.

PRIMARY. The first; the oldest rock formations.

PROP. A heavy timber placed with its foot against the floor of a mine opening, and its top against the roof, to support the rock above.

PROSPECT. To seek for mineral; a new mining property that has not yet earned the right to be called a mine.

PROSPECTOR. A searcher for mineral.

PROTOXIDE. The oxide of any metal containing the least proportion of oxygen.

PUDDINGSTONE. A coarse conglomerate showing rounded pebbles.

PULLEY-STAND. A temporary tripod or other light frame construction, holding a pulley, over which passes the rope used in hoisting.

PULP. Pulverized ore or concentrates.

PULVERIZE. To crush to powder.

PULVERULENT. That which easily may be reduced to powder.

PYRRHOTITE. Magnetic iron sulphide.

PYRITE. Iron disulphide.

PYRITES. Sulphide ores; more properly iron disulphide.

PYROGNOSTICS. Characteristics of a mineral under the blowpipe.

QUARRY. An open pit, of varying size, sometimes several acres, from which stone or ore is mined.

QUARTER-SECTION. In the United States a quarter of a square mile; 160 acres, laid out in a parallelogram, each side of which is one-half mile in length.

QUARTZ. Silica. Dioxide of silicon, frequently containing traces of iron and other minerals, and often the gangue of gold and other metals.

QUARTZ CLAIM. In the United States mining claims are divided into two classes, the first being placer claims, carrying mineral, usually gold, in alluvium, and quartz claims, this name being applied to any prospect carrying metalliferous bodies in place.

QUARTZITE. An oxide of silicon, with other minerals in varying quantities, partly granular and partly crystalline in structure.

QUARTZOSE. Rock having much quartz in its composition.

QUICKSAND. Fine sand, which flows easily when wet.

RAGGING. Cornish for rough cobbing; broken lumps of ore of medium size.

RAISE. A shaft or winze that is being opened from below. Sometimes called upraise or uprise.

RAKE VEIN. A vein cutting through stratified rocks.

RANGE. A mineral belt, also in many American states a surveyor's term for describing and locating lands. The state is surveyed in sections (with their subdivisions), towns and ranges. A town (or township) comprises 36 sections and is a square of six miles. Each township receives a double number, one for the town and one for the range. The towns are numbered consecutively from south to north, and the ranges are similarly numbered from east to west.

RAW ORE. Ore before treatment.

REAMER. A tool like a bit, used to enlarge a hole previously drilled.

REDUCTION. The separation of metals from their ores.

REEF. A stratified mineral-bearing rock formation.

REFINING. The elimination of impurities from crude metals, or separation of metallic alloys obtained in the reduction of ores.

REFRACTORY. A refractory ore is one that cannot be smelted by ordinary metallurgical processes. A refractory stamp-rock is one that is pulverized with unusual difficulty.

REGULUS. Copper matte.

RENIFORM. Kidney-shaped.

RESERVES. Bodies of mineral-bearing ground opened in a mine ahead of immediate requirements.

REVERBERATORY FURNACE. A smelting furnace in which the flame from the grate below is reflected back by the roof, on the charge of ore above.

RISE. A raise.

ROASTING. Driving off sulphur and other volatile elements from ore, by heat. When done in a furnace, under great heat, the process is called calcining.

ROASTING FURNACE. An oven for the expulsion from ore of sulphur, arsenic and other volatile elements.

ROB. To remove pillars and other supports from a mine for their mineral values, regardless of the future of the property.

ROCK. Stone.

ROCK BREAKER. A rock crusher.

ROCK BURROW. A pile of refuse rock from a mine.

ROCK CAR. An ore car.

ROCK CRUSHER. A machine for reducing rock or ore to smaller sizes. Crushers are of two types, the jaw-crusher and the centrifugal. The jaw crusher works as a man cracks nuts with his teeth, the centrifugal operates on the plan of a coffee-grinder.

ROCK DRILL. A power drill.

ROCK DUMP. A rock burrow.

ROCK FILLING. Waste rock, placed in worked-out stopes to support the roof.

ROCK-HOUSE. A building where copper-bearing rock is received and put through crushers before shipment to the mill. Is really a preliminary mill, and usually is built in connection with the shafthouse.

ROLL. To make depth at irregular angles.

ROLLS. Heavy steel rollers, worked in pairs, like a clothes wringer, for crushing rock and ore.

ROOF. The rock above a mine opening.

ROOM. Similar to a stope; term usually applied to mines working mineral bodies lying nearly horizontally.

ROYALTY. A percentage paid to the fee-owner from mineral values obtained by the lessee of a mine.

RULE-OF-THUMB. The guesswork and rough measurement plan of mining, in contradistinction to systematic development from data obtained by careful surveys.

RUN. A bar or course of ground better or worse than the average value of the mine.

RUNNING GROUND. Superincumbent material that falls into the mine openings.

SADDLE. An anticline.

SAFETY CAGE. A cage furnished with automatic appliances to stop its descent in case the cable breaks.

SALT. A chemical union of an acid with a base.

SALTING. Placing foreign ore in a mine to deceive intending purchasers or other interested parties.

SAMPLE. A specimen of ore from a mineral deposit. A selected sample usually is misleading because containing far above average values, and fine samples frequently come from the poorest mines. An average sample is what its name purports—if it be an average sample.

SAMPLING. Securing sufficient ore from mine openings to allow a test to determine average values. Honest sampling requires great skill and prolonged practical experience.

SAND PUMP. A pump, usually centrifugal, designed to lift water carrying large quantities of coarse tailings or sand in solution.

SANDS. Tailings from the stampmills of Lake Superior copper mines.

SAND SHAFT. A shaft sunk through quicksand.

SAND WHEEL. A large wheel, having buckets on its inner perimeter, for elevating water carrying stamp-sand.

SCALE COPPER. Copper in very thin flakes.

SCHIST. A metamorphic laminated rock of foliated structure, made up of superimposed flattened particles.

SCHISTOSE. Of the nature of schist.

SCORIA. Slags from copper smelters; volcanic ash.

SCORIACEOUS. Of the nature of scoria.

SCRAM. A mine that is being gone through carefully, when apparently worked out, for mineral previously overlooked.

SCRAMMING. Searching a mine for mineral previously overlooked.

SCREEN. A grating of perforated metal or woven wire.

SEAM. A thin layer of rock or ore.

SECONDARY ENRICHMENT. Nature's process of evolving high-grade from low-grade ores. See chapter on geology.

SECTILE. That which may be cut easily.

SECTION. A field or district; also, in the United States of America, square mile of land.

SECTION POST. A boundary mark set at section corners, by surveyors.

SEDIMENTARY. Rocks formed by deposition from water, as contradistinguished from rocks formed by igneous action.

SELVEGE. Fluccan.

SET. A framed form of timber, used for supporting ground in a mine.

SHAFT. A downward mine opening having its upper end at surface.

SHAFT-HOUSE. A building at the mouth of a shaft, where ore or rock is received from the mine.

SHALE. An argillaceous slate, of fissile structure.

SHEAVE. A grooved wheel, notched to carry rope; an open pulley.

SHIFT. A miner's turn, of eight to ten hours' work; a force of men employed on one turn.

SHIFT-BOSS. A mine boss, or under-captain, in charge of one gang or party of miners.

SHOE. A stamp shoe.

SHOOT. A chute.

SHORT TON. A weight of 2,000 pounds avoirdupois.

SHOT. A blast of some explosive.

SHOT COPPER. Small rounded nodules of native copper, somewhat resembling small shot in size and shape.

SHUTE. A chute.

SILICA. Dioxide of silicon.

SILICATE. An ore of any metal or metals chemically united with silica.

SILICIOUS. Containing much silica or quartz.

SILL. The floor-piece of a set of mine timbers.

SINKING. The process of deepening a shaft or winze.

SINKING-PUMP. A movable pump, usually vertical, secured to a platform, and lowered as required, as the shafts are deepened.

SKIP. An iron box, open at the top, running on four wheels, and hauled

by a cable, used in incline shafts for hoisting ore and rock, and for lowering timber.

SKIP-ROAD. A track of T-rails, spiked to wooden sleepers, on which a skip runs.

SKIP-WAY. A skip-road.

SLAG. The vitreous refuse matter from a smelting furnace.

SLICE. To remove mine pillars.

SLICKENSIDE. A polished rock surface, showing striations produced by movement of adjoining rocks under great pressure.

SLIDE. A dissociation of strata caused by the subsidence of the overlying rock formation.

SLIME. Exceedingly small particles of rock and mineral held in solution in water.

SLIME TABLE. A circular revolving table, whereon slimes are worked, and the minute particles of mineral saved.

SLIP. A fault where a superincumbent stratum has slid downward.

SLUDGE. Mixed rock and water, brought to surface where a diamond drill cuts through very soft rock: tailings from a concentrator or mill.

SLUICE. A wooden flume or launder.

SMELTER. Works where ores or crude metals are freed from gangue or chemically united elements by heat.

SMELTING. The reduction of ores and crude metals, in furnaces, by heat, fuel and fluxing material being added to the matter to be smelted.

SMELTS. A smelter.

SOAPSTONE. Steatite.

SOFT GROUND. Underground openings that do not stand well and require heavy timbering.

SOLLAR. A platform in a shaft.

SPATHIC. Having a form approximating that of feldspar.

SPECIMEN. A sample of mineral selected because typical, unusual or exceptionally rich.

SPEISS. Impure metallic arsenides produced in copper smelting; ore particles finely disseminated throughout a rock, usually occuring as impregnations.

SPHALERITE. Zinc blende; zinc sulphide, often found associated with galena and chalcopyrite.

SPILL. Lagging driven ahead of the regular timbering in treacherous ground.

SPITZKASTEN. Pyramidal boxes wherein ores are concentrated and sized by a jet of water fed from below.

SPOON. A long-handled spoon, used to scrape out drill holes.

SQUARE SETS. A form of mine timbering having forms with mortised and tenoned sill, top piece and uprights of equal length, joined at right angles.

SQUIB. A fuse.

SPRAG. A cross-timber set to secure the hanging wall in a stope.

SPUR. A short branch from a principal ore vein.

STACK. The chimney of a furnace; usually employed to designate a number of furnaces, when used in the plural.

STAMP-MILL. A mill for crushing and concentrating minerals.

STAMP-ROCK. Rock containing fine copper that can be secured by crushing and jigging.

STAMPS. Machines to crush rock or ore by heavy blows.

STAMP-SHOE. The heavy chilled iron casting attached to the lower end of a stamp piston, that does the actual crushing of rock in a stamp-mill.

STANNIFEROUS. Tin-bearing.

STATION. A chamber in a shaft, cut out for pumps, etc.

STATION-PUMP. A mine pump permanently placed, as distinguished from a movable sinking-pump.

STEAM-HAMMER. A heavy hammer, actuated by steam or compressed air.

STEAM-STAMP. A stamp actuated by steam.

STEATITE. Soapstone. A greasy mineral, having a talc base.

STEP FAULT. A series of faults, rising like steps.

STOCKWERK. Country rock penetrated by numerous small stringers of ore, the entire mass averaging sufficiently rich to permit its mining and treatment.

STOPE. Used interchangeably to designate the excavation above a drift, or the pay-rock remaining unmined above a drift.

STOPING. Breaking down the mass of pay-rock or ore above a drift. When stoping in an ore body of average width, miners can break rock much more quickly and cheaply than when driving the drifts, which are about 7x7 feet in size.

STOPING GROUND. Ground in reserve, opened by drifts, and ready for breaking down.

STRATA. The successive rock layers of the earth.

STRATIFIED. Having regular layers of varying rock forms.

STRATUM. A layer or bed of rock.

STREAK. The color given by a mineral when scratched or rubbed on porcelain.

STRIKE. The horizontal trend of a mineral body, measured by the points of the compass; a discovery of ore.

STRINGER. A thin seam of ore.

STRIP. To remove the drift or alluvial soil overlying an ore body.

STRIPPING. The drift or alluvial soil overlying an ore body.

STRUCTURE. The form of a mineral, whether granular, crystalline or amorphous.

STUDDLE. A prop in a mine.

STULL. The top-piece of a set of mine timber.

SULPHATE. An ore of any metal or metals with which sulphur and water are united chemically.

SULPHIDE. An ore of any metal or metals with which sulphur is united chemically. Sometimes called a sulphuret.

SULPHOANTIMONITE. An ore of any metal or metals with which sulphur and antimony are united chemically.

SULPHOARSENITE. An ore of any metal or metals with which sulphur and arsenic are united chemically.

SULPHURET. A sulphide. Term becoming obsolete.

SUMP. The pit at the bottom of a shaft, where water collects.

SURFACE CAPTAIN. A mine superintendent whose duties are wholly on surface.

SURFACE RIGHTS. The ownership of the surface of land only, when mineral rights are reserved.

SWABSTICK. A stick used to clean out drill-holes.

SYNCLINAL. A syncline; of the nature of a syncline.

SYNCLINE. A trough formed by rock strata that are low in the center and high on the sides. The reverse of an anticline.

TABLE. An ore concentrator taking finely crushed particles of ore and gangue for separation.

TABLE LAND. A plateau.

TAILINGS. Refuse matter from a mill.

TAMP. To closely pack clay or other sticky earth into a drill-hole above the cartridges, to give greater force to the blast.

TAP. To draw off molten metal or slag from the vent of a furnace.

TAPER OFF. Cornish for stopping work temporarily.

TELERA. Spanish for a roast-heap of sulphide ore.

TENOR. The average metallic content of an ore, matte or impure metal.

TENSILE STRENGTH. The resistance to breaking or elongation offered by metal when under strain from either end.

TERRERO. Spanish for burrows of partly leached ore.

TERTIARY. Rock forms of the third great geological period.

TEST-PIT. A shallow pit sunk to discover mineral.

THROW. The vertical displacement of a vein caused by faulting.

TIMBER. The wooden beams and sticks used for underground supports.

TIMBER-BOSS. The head timberman.

TIMBERMAN. One who works at timbering a mine.

TON. See metric, long and short tons.

TONELADA. Spanish for long ton.

TOSSING. Jigging finely comminuted ore.

TOWN. See Range for description.

TRACHYTE. A micaceous hornblende and feldspar rock.

TRAM. To load rock or ore in tram-cars and push same to the shaft; tramway.

TRAM-CAR. A car running underground, on T-rails, used for carrying rock from the stopes and other workings to the shafts.

TRAMMERS. Men who load and tram the broken rock underground.

TRAP. A dense gray, blue or greenish rock of volcanic origin; of considerable variety in different beds, but usually of feldspathic-augitic nature.

TRAPPEAN. Of the nature of trap.

TREND. The general direction of a mineral body.

TRESTLE. A frame-work of timbers, connecting various mine and mill buildings on surface, usually carrying tram-tracks.

TRIBUTE. The royalty or percentage paid by workmen to owners for the privilege of working a mine. Apt to be a form of grand larceny, at the expense of the mine's future.

TRIBUTOR. One who works a mine on tribute.

TRIPOD. The three-legged iron fame on which the working parts of a power-drill rest; a three-legged wooden frame over the mouth of a pit or shaft.

TROLLEY-CABLE. A wire rope sometimes used in an incline shaft as a guide for the bucket.

TROUBLED. A vein is troubled when disturbed or faulted.

TRUE FISSURE VEIN. All mineralized fissures are true fissure veins. Term commonly used as meaning a fissure vein with promise of holding to great depth, in contradistinction to a gash vein.

TSUBO. A Japanese measure of six feet square, equalling 36 square feet.

TUFA. A porous limestone. Name frequently used in place of tuff for rock of volcanic origin.

TUFF. Scoriaceous material from volcanic vents, solidified by time and superincumbent pressure. Tuffs range in density from porous pumice-stone to dense and exceedingly refractory conglomerates.

TUNNEL. A practically horizontal opening entirely through a hill or mountain. Term is commonly used instead of adit, which is a horizontal gallery having only one opening to surface.

TURBINE. The most efficient form of a water-wheel; also a new form of steam-engine in which the entire movement of the power producing parts is rotary instead of reciprocating.

TUYERES. The vents by which air is supplied, under pressure, to blast furnaces and bessemer converters.

UNCONFORMABLE. Rock strata that do not correspond as to bedding, or geological horizons.

UNDERHAND STOPING. Removing ore in descending steps.

UNDERLAY. The mineral bodies lying under a given tract, though not outcropping on surface.

UNDERLIE. The underlay.

UNPATENTED. Mining claims held from the United States Government, subject to annual assessment work.

UNSTRATIFIED. Rock forms not bedded in layers.

UNWATER. To free from water; to pump out.

UPCAST. A shaft having an upward air current.

UPRAISE. A raise.

VAN. To dress ore.

VANNER. A jig for dressing ore by means of vibratory motion, aided by jets of water to carry away gangue-rock.

VARA. A Spanish-American measure of length of 33 inches.

VEIN. A mineral body having defined walls. See contact vein and fissure vein.

VEINSTUFF. Ore with its associated gangue.

VENTILATION. The system of natural or artificial air currents in a mine. See air-shaft.

VERTICAL. Perpendicular. Upright and downright.

VERTICAL SHAFT. One sunk at an angle of 90° with the horizon, or directly downwards toward the center of the earth.

VINNEY. Cornish for copper ore with a green coating caused by weathering.

VIRGIN. Native metal occurring elementally, as distinguished from ores, which are chemical compounds.

VITREOUS. Of a glassy nature.

VOLATILE. That which can be driven off as vapor, by heat.

VUG. A druse. A hollow, or cave, entirely surrounded by rock. Usually shows fine crystallizations.

WALL. Rock of a different formation adjoining a vein or other ore body.

WATER DRILL. A power drill in which a current of water runs through the bit of a drill, changing the rock-dust from the bit into sludge, which is expelled from the bore-hole by the force of the current.

WATER-JACKET. An outer casing for a blast-furnace, in which water circulates, to keep the metallic furnace-walls from melting because of the intense heat of the charge.

WATER LEVEL. The ground water level is the point above which water does not rise when a mine is allowed to fill. The basic water level is the point below which altered and enriched ores are succeeded by base unaltered sulphides.

WEATHERED. Rock altered in structure by exposure to air and water.

WET PROCESS. Lixiviation.

AL. Cornish for mine. Synonymous with bal.

M. A windlass with a horizontal drum.

P. A rope and fixed pulley or pulleys for hoisting.

FLEY. A Wilfley concentrating table.

CH. A windlass.

ZE. A blind shaft, usually short, leading downward from a hori-ening of a mine.

DLASS. A winding device for hoisting from a pit or shaft, by coiling a rope or cable around a drum.

E BARS. Refined copper cast into bars for wire drawing.

RKINGS. The underground openings of a mine.

C BLENDE. Sphalerite. Sulphide of zinc.

CIFEROUS. Carrying zinc.

C SULPHIDE. Sphalerite.

CHAPTER XIV.

Copper Deposits of the United States.

Copper is found throughout the entire length of the Rocky Mountains, in Canada, the United States, Mexico and Central America, and in the cordillera of the Andes in South America from the extreme north to Punta Arenas on the Straits of Magellan. The North American copper deposits apparently are richer west of the main range of the Rockies, and the principal deposits, as a rule, occur in various isolated mountain ranges in the high tablelands between the Rocky Mountains and the Pacific. In the eastern part of the United States the Appalachian Mountain system carries copper ores from Maine to Alabama, the principal deposits occurring in the Green Mountains, Blue Ridge Mountains and Piedmont Mountains. In the Lake Superior district native copper is carried in the roots of an ancient mountain range. The mines of the United States furnish 55 to 60 per cent. of the total copper supply of the world. Occurrences of copper are treated by states, in alphabetical order.

ALABAMA. In the northeastern portion of Alabama the extension of the Ducktown district of Tennessee carries pyritic ores of a similar nature. Copper occurrences are noted in the counties of Cleburne, Clay, Coosa, Dean, Haralson, Marion and Randolph.

In Cleburne county considerable copper mining was done in the eighth decade of the Nineteenth Century. The Woods or Stone Hill mine showed a prominent gossan, with chalcocite in the secondary zone, succeeded by chalcopyrite at comparatively shallow depth. The ore was but slightly argentiferous and carried occasional sphalerite. The Smith mine, near the Woods, had a similar ore body.

Mines of cupriferous pyrites have been opened recently in Clay county, and copper ore is found near Goodwater in Coosa county. Cupriferous pyrites are being developed in Dean county. In Haralson county the Tallapoosa pyrite mine, about 25 miles east of Tallapoosa, shows lenses of slightly cupriferous iron pyrites.

ALASKA. The territory of Alaska is greater in area than France, Germany, Belgium, Holland and Denmark combined, and its copper deposits are scattered over a vast territory, in most cases but slightly explored. Transportation facilities are excellent for the coast mines, but lacking for the interior properties, which must have rail connections in order to become producers. The first important copper production was secured in 1904, from coast mines. The geography of Alaska remains somewhat vague as to the interior, by reason of the country being so vast, so sparsely populated and so slightly developed. It is known that certain tribes of aborigines possessed copper before the coming of the white man, and it is altogether probable that this copper was secured from the native deposits of the metal found in the Copper River country and adjoining fields.

The principal copper districts of Alaska, so far as now known, are those of Prince of Wales Island, Prince William Sound and the Copper River coun-

try, the latter an immense district with numerous occurrences of ore and native copper. Alaska never has been organized as a territory, and has no counties, hence the difficulty in giving anything like exact limits to the districts of the interior.

The principal copper field of the present is the Prince William Sound district, which includes a long stretch of mainland and outlying islands. This district includes Latouche Island, Knights Island and the Ketchikan field. Nearly all of the mines are located within a mile or less of tide-water, and are enabled to ship their ores easily and cheaply to smelters along Puget Sound. The ore is mainly chalcopyrite, commonly associated with pyrrhotite and occasionally with pyrite, with a little chalcocite and malachite, occurring along shear zones and in sedimentary slates and altered lava flows called greenstones. As a rule, there are fairly strong gossans of slight depth. Latouche Island has several promising properties that are shippers, and the Bonanza mine has a large ore body outcropping on a mural escarpment near the sea. Knights Island shows promising sulphide ores in greenstone and associated rocks of the Orca series. Glacier Island also shows ore of promise. Ketchikan is the principal town of this district.

Several mines have been developed on Prince of Wales Island, mainly on contact deposits between limestone and intrusive diorite or greenstone. Below a shallow zone of oxidation the ore is mainly chalcopyrite, associated with magnetite, in lenses up to 40 feet width and 150 feet length, the chalcopyrite carrying one to two dollars gold per ton, with small silver values.

The Copper River country includes a number of sub-districts of large area, around the headwaters of the Copper, Tanana, Shusitna and White rivers, including portions of the Wrangell, Chugatch and Alaskan mountain ranges. The Copper River basin is a broad syncline, the central part of which is occupied by the Wrangell Mountains, of Tertiary age. The most prominent rock formation is the Nicholai greenstone, associated for about 200 miles with Permian limestone. The Nicholai formation consists mainly of amygdaloidal flows, resembling those in the Lake Superior district, and carries native copper and secondary sulphides. The flows are mainly altered basalts, containing considerable metallic copper in fissures, or in sedimentary rocks near the point of contact with the traps. Copper occurs native and as oxides in shear zones, or as chalcocite and bornite in veins in greenstone. Bornite, which is the principal ore, is slightly auriferous and argentiferous.

The basin of the Kotsina River, in the Copper River district, shows native copper with quartz gangue, near the basal flows of the greenstone series, filling amygdules in greenstone and associated with epidote, as in the Lake Superior district, there being a little bornite and chalcopyrite in connection with the native copper. This district is about 125 miles northeast of Valdez.

The Chitna district shows numerous occurrences of sulphide ores, with native stream copper along the valley of the river, and between the river and Mount Wrangell. On Nugget Creek, a tributary of the Kuskulana River, a mass of native copper reported as three by eight feet in size was found. Native copper is found on the headwaters of the Nizina River.

Numerous copper occurrences are noted on the headwaters of the White River, and small masses of native metal weighing up to ten pounds have

been found in greenstone dykes, said to traverse limestone and schists. The veins are small, and those noted seem of small importance. Along Kletsan Creek, near Scolai Pass, on the divide between the White and Chitna Rivers, native copper occurs as stream metal, evidently derived from ancient basaltic dykes intersecting diorite and Carboniferous limestone. Most of the valley is overlaid with a deposit of volcanic ash, up to one hundred feet in depth.

Native copper is reported from the Kenai Peninsula and the Turnagain Arm district, and copper sulphides occur in metamorphic rocks in the Kenai Peninsula. Copper ores are reported from Resurrection Bay and Lynx Creek, 50 miles north of Seward, and on the Knik River and Lake Iliama, west of Cook Inlet.

ARIZONA. Arizona is the second district of the United States and of the world in point of copper production, ranking second only to Montana. No other copper field has shown such heavy gains in production during the past decade, and there is none with brighter prospects for the future. About one-sixth of the copper mines of the United States are found in Arizona, and of this number many are of very doubtful value, while a few are of thoroughly demonstrated worth, and a considerable number are properties of much promise.

There are evidences of rude mining operations by prehistoric peoples at a number of points, but no traces of smelting, and, had the copper ores been reduced, the slags and possibly remnants of the furnaces scarcely could have escaped attention. It seems probable that azurite, malachite and ochrous iron were mined, in a crude way, for pigments, and prehistoric turquoise mines have been found at several points, notably in the Dragoon Mountains.

The first copper smelter of Arizona, built of adobe bricks, is said to have been located at the Ajo mines, in Yuma county, about 40 miles southeast of Gila Bend, and to have been operated by P. R. Brady and others, immediately after the Gadsen Purchase, in 1852. In 1873 copper production was begun from the Longfellow mine, near Clifton, Graham county, with an adobe furnace.

There are numerous copper districts in the various counties, these having, as a rule, a generally southeasterly and northwesterly trend, with copper deposits commonly on or near the contacts of igneous rock with Paleozoic limestones, mainly of the Carboniferous series. The greater portion of Arizona is included geologically in the Sonoran Plateau, with conditions much the same as in the adjoining Mexican state of Sonora.

Central and southern Arizona form a plateau of 1,000 to 5,000 feet elevation, grading to nearly sea-level along the western edge, with numerous isolated mountain ranges. Apparently this part of Arizona emerged from the seas late in the Tertiary age.

Arizona has copper mines, or attempts at mines, in the counties of Apache, Cochise, Coconino, Gila, Graham, Maricopa, Mohave, Pima, Pinal, Santa Cruz, Yavapai and Yuma, this list including every county in the territory. The principal districts, in order of importance, are the Warren district at Bisbee, Cochise county, the Greenlee district of Graham county, the Globe district of Gila county and the Jerome district of Yavapai county,

with a number of minor districts of some present importance and considerable future promise.

Apache county has copper deposits, apparently of promise, mainly undeveloped and but slightly prospected.

In Cochise county the Warren district, lying in the Mule Mountains, commonly called the Bisbee district, is the only important producer. Copper ores are shown, however, in the Chiricahua, Dragoon, Huachuca, Rincon, Swisshelm and Whetstone Mountains. In the California mining district of the Chiricahua Mountains no important mines have been developed, though considerable good ore has been uncovered. In the Johnson camp of the Dragoon Mountains an intrusive granitic core is flanked by schist, quartzite, conglomerate and limestone, the latter carrying ores near a quartzite contact, the oxidized ores including chrysocolla, with sulphides at depth. Considerable development work has been done in the Huachuca Mountains, but no producing mines have been developed as yet.

The Bisbee or Warren district may be compared in form to half of a peach, retaining the pit, which corresponds to Sacramento Hill, a big gossan blowout half surrounded by a semi-circle of irregular ore bodies in limestone, with granite-porphyry to the northeast, the gulch between the mountains being roughly the dividing line between the porphyry and limestone. There is a conglomerate capping over the junction between the porphyritic and limestone rocks, with numerous quartzite dykes intruding the limestone. The rocks of the Bisbee district may be divided into five groups, these being pre-Cambrian crystalline schists, Paleozoic sedimentaries, Mesozoic sedimentaries, Quaternary sedimentaries and igneous intrusives. The underlying crystalline schists, of pre-Cambrian age, are unconformable with the superimposed stratum of Cambrian quartzite, about 450 feet in thickness, above which lie about 4,500 feet of limestones of Cambrian, Devonian and Carboniferous ages, with copper occurring in the Carboniferous series, the ore developed so far occurring in the beds known locally as the Naco and Escabrosa limes, which are considerably faulted. The ore bodies evidently were caused both by contact metamorphism and by percolating waters. The mineralization obviously came from the porphyritic intrusives, presumably of Carboniferous age, and in the Cretaceous period a subsidance caused an accumulation of about 4,500 feet of superimposed sandstones, conglomerate, shales and limestone, followed by emergence and much erosion, with considerable faulting. There is much displacement, accompanied by thrust-faulting, with overthrusts of nearly two miles. The limestone has numerous caves, often showing beautiful stalactitic formations, and crystalline copper carbonates. Along the contacts of the igneous and sedimentary rocks there are large masses of low-grade cupriferous pyrite, partly oxidized, and Sacramento Hill contains low-grade disseminated copper and iron pyrites. The ore occurs in very irregular bodies, but with a marked tendency to follow the bedding planes of the limestone, and the principal ore bodies found so far are adjacent to, and, as a rule, not more than 1,000 feet from, the porphyry contact. The copper ore outcropped at what is now known as the Cave shaft of the Copper Queen mine, and dips under the gulch at an even sharper angle than the drop of the gulch itself.

All of the more common oxidized and sulphide ores are noted, and there is considerable native copper, occurring as masses up to some hundredweights in size, and as finely comminuted native metal in the fluccan, which is heavy along the walls. The principal ores are disseminated chalcocite and chalcopyrite, the chalcocite usually being associated with manganese in a talc gangue, and being the source of more than half of the total copper production of the district. There are small but appreciable values in silver and gold, and to the northwestward of the cupriferous crescent are lead ores, and, in fact, Bisbee was a lead camp previous to the opening of the copper deposits of the Copper Queen mine, in 1880. The zone of oxidation is most erratic, and full oxidation is noted to the greatest depth yet reached, which is nearly a quarter-mile. The secondary sulphides are found with oxidized ores above and below, and even the unaltered sulphide, chalcopyrite, is sandwiched between oxidized ores and native copper, in a most confusing manner. Indications are not especially promising either north or south of the cupriferous crescent, though narrow fissure veins, containing high-grade ores, are noted in the granite-porphyry for nearly the entire length of the range.

In Coconino county there are promising copper outcrops on the southern plateau of the Grand Cañon of the Colorado River, and several small mines have produced limited quantities of ore, mainly rich carbonates, with occasional chrysocolla and a little chalcocite. There also are developing copper mines in the vicinity of Flagstaff, and at Ryan, in the northern part of the county, near the Utah line.

The first mines in the Globe camp of Gila county were opened for silver, in 1874, and were closed in 1877, copper mining beginning in the following year. The pioneers suffered severely from raids of the Apaches, and worked under great economical disadvantages, due to poor transportation facilities and expensive fuel. Oxidized ores only were smelted until 1902, when sulphide smelting was introduced. The geological base of the Globe district is the Pinal schist, of pre-Cambrian age, succeeded by the Apache group of pre-Cambrian rocks and the Globe limestone, including beds of age from Devonian to upper Carboniferous, faulted by the Gila conglomerate of Tertiary age. After the laying down of the Gila conglomerate there was much faulting and compression, with marked metamorphism, with a complex of eruptives enjoying a great variety of lithological cognomens, according to the fancy of the geologists. Roughly speaking it may be said that a limestone and diabase contact shows ore bodies occurring as irregular lenses, practically parallel with the horizontal bedding planes of the limestone series, up to nearly 600 feet in thickness, resting on quartzite. The Old Dominion fault is a very prominent geological landmark, ore occurring mainly on the southern side. There are fissure veins and fault-fissures, but many fissures are not all mineralized. The average strike of the veins is approximately northeast and southwest, with dips of 40 to 90 degrees. The ore bodies may be divided into three classes, these being irregular masses in limestone, fissure veins, and irregular mineralizations of the permeable rocks. Ores are mainly oxidized, but with occasional occurrences of sulphides, which may have oxidized ores below as well as above. The oxidized ores carry considerable hematite in their gangue, but are highly silicious and require heavy fluxing with iron as well as lime. The shortage of sulphide ores needed to furnish iron for fluxing the oxidized

ores is a drawback to the field. The Globe district is quite extensive in area, and the Gibson property shows veins of very high-grade massive secondary sulphides, in schist. Copper developments are under way in the San Carlos and Christmas districts, and elsewhere in Gila county.

The Greenlee district, in which are found the mining towns of Clifton, Morenci and Metcalf, is known commonly as the Clifton district, and is the oldest of the present important copper fields of Arizona, dating from 1872, and also is notable for the invention of the water-jacket blast-furnace. This district is second in Arizona as a producer, but is second to none in size of its ore bodies, though the ore, while occasionally found in high-grade fissures, is mainly of low copper tenor. The Arizona and Detroit mines are working low-grade ore bodies carrying 3 to 4 per cent. copper only, and the future of the district rests mainly on extensive development of ore bodies of even lower average tenor.

The geology of the Clifton district probably is more complex than that of any other important copper field of the world, and would require a monograph of a hundred pages or more for a complete exposition. A most critical and exhaustive study of this field has been made by Prof. Waldemar Lindgren, of the United States Geological Survey, and his report thereon is a monumental work. The Clifton district may be described as a geological island of pre-Tertiary granite-porphyry, quartzite and limestone, surrounded by lava flows and a sedimentary series of Paleozoic age, including quartzite and conglomerate, upon which is imposed about 800 feet of limestone beds of Silurian, Devonian and Carboniferous ages, intruded by porphyry and partially covered with flows of rhyolite and andestite. The porphyry is essentially a monzonite and much of it is workable as an ore of low grade. Contact metamorphism apparently is responsible for most of the extensive mineralization, though there are evidences at many points of secondary enrichment. The oxidized zone extends from surface to a depth of 50 to 200 feet, usually carrying oxidized ores of greatly varying tenors, though sometimes barren. The zone of secondary sulphides is 100 to 500 feet in depth, carrying chalcocite and bornite, succeeded by the pyritic zone carrying chalcopyrite and sphalerite, associated with pyrite. The ores of the pyritic zone are low in copper tenor, and difficult of reduction, because of the considerable quantities of zinc associated therewith, but this zone contains enormous quantities of ore, which, without question, will be extracted in the future. The ore bodies include oxidized ores occurring in irregular forms near contacts, also fissure veins of sulphide ores in the porphyritic zone, and contact deposits in prophyry. There also are stockwerks, carrying veinlets of disseminated chalcocite, these occuring mainly in porphyry, but occasionally in quartzite. The cupriferous monzonite may be considered the predominant ore deposit, this containing finely disseminated chalcocite in a highly altered monzonite-porphyry, with the gangue ranging from quartz to talc. Considerable brochantite is produced, this being one of the few districts where brochantite is found as a commercial ore. The rich oxide and carbonate ores of early days are practically exhausted, in the older and larger mines, but oxidized ores low in copper tenor are treated by leaching, this being one of the very few American copper fields in which leaching processes are employed successfully. The average of all ores treated in the district is about 3.5 per cent. copper and 18 cents gold per

short ton, while the oxidized ores treated by the Arizona Copper Co. avera under 3 per cent. copper, and are the lowest in grade of any copper o treated at a profit in Arizona.

In addition to the mines of the Greenlee district there are small cop properties elsewhere in Graham county, notably at Fort Thomas, F Grant, Pima, Safford, Solomonville and Willcox.

Maricopa county has a considerable number of developing mines, various degrees of promise. The principal copper mining districts are fo at Wickenburg, Cave Creek and Morristown.

Mining operations in Mohave county have been mainly for the preci metals, but there are a number of developing copper mines in the vici of Kingman and Chloride, and copper properties of considerable pro are noted along the Colorado River, and on the Bill Williams Fork R that forms the boundary line between Mohave and Yuma counties.

Navajo county has no copper producers, but there are ore bodies ap ently worthy of serious investigation. On the Navajo Indian Reserva shortly south of the Utah line, Triassic sandstones show a stratum ca ing chrysocolla and occasional melaconite, as speiss and nodules, rich very erratic in occurrence.

The principal producing copper field of Pima county is the Silver district, though production has begun from the Pima district. The pr pal mining fields of the county are found in the Sierrita, Santa Rita Santa Catalina mountains. In the latter district, near Tucson, mor less exploratory and development work has been done for about s miles. The mountains show a granitic core, with quartzite and limes sedimentary beds, cut by intrusive dykes of diabase, with ore occurr along the dykes.

The Silver Bell district is in the Silver Bell Mountains, a small, lated range of less than 3,000 feet elevation. The hills have granite b with quartzite and limestone strata superimposed, the latter being eroded, with the usual intrusive rocks, the ore bodies occurring as irre masses with prominent gossans, in porphyry shear-planes, and in lime and granite-porphyry, near the contacts. The ores are mainly chalcop and bornite.

The Pima district, on the slope of the Sierrita Mountains, was first in 1880, for silver-lead ores. This district shows large bodies of grade ore in limestone, and occasionally in porphyry, along the conta these rocks, the ore usually having a limestone gangue, there being i ive quartzites.

In the Santa Rita Mountains the Helvetia district shows Carl erous limestone strata, with prophyritic intrusions, the ore bodies sh good gossan outcrops.

Pinal county, while having no large copper producers, has severa tricts of decided promise, and should become an important copper field, further development. The Ray or Kelvin district shows a zone o proximately one mile width, with a length of at least three miles, in occur banded acid igneous rocks, giving strong evidences of thermal ations and silicification, carrying chalcopyrite coated with chalcocit small particles and thin veinlets, with gangue of country rock, and

and silver. There is a limited zone of oxidized ores, largely worked out, but the principal values are in disseminated sulphides.

Yuma county was accessible with such difficulty, until the building of the Arizona & California railroad, in 1906, that copper mining developments have lagged, though there are notable deposits of copper ore along the Colorado and Bill Williams Fork rivers. The Empire Flat district shows schist and limestone beds with intrusive granite, carrying fissure veins with strong gossans. The ores are of great variety, and exceptional richness, including considerable chrysocolla in the oxidized zone, and secondary sulphides of high average tenor. The district around Empire Landing, about 75 miles above Empire Flat, is partly in Yuma county, Arizona and partly in San Bernardino county, California. Although explored slightly during the preceding twenty years, development may be said to date from the advent of a railroad, in 1906, though some copper ore was mined and shipped by way of the Colorado River to Swansea, in early days. There are ore occurrences of considerable promise in this district.

ARKANSAS. Copper ores are noted sparingly throughout the Ozark uplift, and copper deposits are found in the counties of Baxter, Garland, Montgomery, Marion, Pulaski, Searcey and Sevier. The ore as a rule is chalcopyrite, and quite commonly is associated with galena and sphalerite. The lead and zinc deposits of the Ozark region apparently are of greater promise than the copper ores. Tetrahedrite and tennantite are noted ten miles north of Little Rock, in Pulaski county.

CALIFORNIA. Few states in the Union are more richly endowed with copper. The first discovery, made in 1840, when California was a portion of Mexico, was near El Paso Soledad, in what is now Los Angeles county, and in 1854 a little copper was produced therefrom. In 1855 copper was discovered in Alpine county, but the Napoleon mine, in Calaveras county, discovered and opened in 1860, was the first Californian copper producer of importance. There was a copper boom in 1862 and 1863, with hundreds of stock companies organized, and between 1863 and 1866, nine small copper smelters were built in the state, the local production being about two million pounds in 1864, in addition to considerable shipments of ore to Swansea, Baltimore and New York. After 1868 the industry was practically non-existent, until 1896, when the Iron Mountain mine, under English management, became an important producer. The high-water mark of production was reached in 1901, with an output of 34,931,985 pounds fine copper, in which year Shasta county produced 30,990,781 pounds, with between one and two million pounds each from Calaveras and Fresno counties, the balance of the output being composed of the small contributions of fifteen other counties. In 1900 California stood fourth among the copper producing fields of the United States.

There are occurrences of copper ore in about fifty of the fifty-seven counties of California, and there are copper mines of more or less importance in the counties of: Alameda, Alpine, Amador, Calaveras, Colusa, Contra Costa, Del Norte, El Dorado, Fresno, Humboldt, Inyo, Kern, Lake, Lassen, Los Angeles, Madera, Marin, Mariposa, Mendocino, Merced, Mono, Nevada, Placer, Plumas, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Clara, Shasta, Siskiyou, Sonoma, Tehama, Trinity, Tulare and Tuolumne.

The copper fields of the state may be divided into four groups, of which the first in productive importance is in Shasta county, the second in the Sierra Nevadas, the third along the Coast Range Mountains, and the fourth in the desert region of Southern California, near the Nevada and Arizona lines. The Sierra Nevada copper belt stretches along the western flanks and foothills of the mountains, showing practically continuous occurrences of copper for nearly 400 miles, reaching from Oregon on the north to nearly the Lower California line. This field contains many old mines, and is a district of much promise. The Coast Range field shows copper deposits for about 150 miles southward from the Oregon line, but the principal occurrences and developments are in Siskiyou and Del Norte counties, on the Oregon boundary. The southern extension of the Coast Range belt also shows copper ores in San Diego and adjoining southern counties. In Kern county there is an apparent branching of the Sierran copper range, with an offshoot that traverses Inyo and San Bernardino counties, reaching over into the neighboring territory of Arizona, thus establishing a close geographical and geological connection between the copper measures of southeastern California and central western Arizona. The mines of Shasta county are of preponderant importance, Calaveras county in the Sierra Nevadas coming second, with Fresno third, and with important developments under way in Siskiyou and Del Norte counties.

As a rule the alteration zone of Californian copper deposits is comparatively shallow, showing oxidized ores of high grade in profusion at surface, usually succeeded by unaltered chalcopyrite at an average depth of about one hundred feet only.

The copper district of Shasta county, as developed, is a crescent of two to three miles average width by about thirty miles extreme length. The principal developments are in the western third of the crescent, though there are properties of promise to the eastward. This district shows an extensive series of sedimentary rocks ranging in age from Miocene to Devonian, associated with igneous rocks of various ages, intercalated with the sedimentaries, or more commonly occurring as intrusives. The western end of the crescent shows slate to the west with granite-porphyry and quartzite to the east. Copper ores occur as sulphide deposits in contact zones and shear zones and a wide and irregular belt of igneous rocks runs from Iron Mountain past Bully Hill, traversing a series of sedimentaries ranging from Devonian up to nearly the top of the Triassic series. A large portion of this rock is volcanic, embracing acid and basic lavas, with fossiliferous tuffs. The entire district is much faulted and sheared, with sulphide ore bodies occurring in shear zones ranging up to hundreds of feet in width. These lenses are usually flat-lying, with chalcopyrite disseminated in pyrite, almost invariably auriferous, but low in copper tenor. The gossan cappings are massive, and large bodies of silicious ore are lacking. The Iron Mountain mine was worked originally for gold and silver values in the gossan.

In Calaveras county the principal developments are in the vicinity of Copperopolis, where mining has been done, more or less regularly, for many years. The ore bodies occur in black pyritous slate, in a bed of amphibole schist, the geological horizon being the same as at the gold mines of the Mother Lode, twelve miles eastward.

Along the coast there are important deposits of cupriferous pyrites i the suburbs of Oakland, Alameda county, on San Francisco Bay, and coppe has been found in sewer digging on Connecticut street, between Eighteent and Mariposa streets, in the city of San Francisco.

Santa Clara county has promising copper deposits in the vicinity o the New Almaden quicksilver mines. Copper was discovered in Los Oso district of the Coast Range Mountains, San Luis Obispo county, in 185 In San Diego county copper occurs in the Encinitas district, and at variou other points.

In the desert country of southeastern California, comprised mainly i the counties of Inyo and San Bernardino, copper occurs at numerous point The Ubehebe district of Inyo county shows promising surface indication and rich ores at several points. The Death Valley region of Inyo county wa the scene of a copper boom in 1906-1907, when many mining companie were organized, and considerable work was done in the Greenwater district which lies on the flanks of the Funeral Range, east of Death Valley. Th formation of the Greenwater district consists of underlying granite-por phyry, with rhyolite flows and tuffs, the summits of the mountains bein capped by remnants of basaltic flows, with no sedimentary rocks known a yet. The mineralized belt is about 30 miles in length, and ores, as found are mainly of high average tenor, highly silicious, occurring in shear zone in granite, having a generally southwesterly trend, in streaks of one to thre feet in width. The Greenwater district has proven disappointing.

COLORADO. Nearly one-third of the refined copper produced by Colo rado smelters comes from ores mined in other states and territories, an upwards of half of the copper production from Colorado mines comes fro Leadville, in Lake county, where the principal mineral products are lead silver and zinc, but at depth there is a marked increase in copper values, an it is possible that Leadville may become a copper camp of importance, i time. Practically the entire copper output of the state is secured as by-product from silver-lead and zinc ores. With the exception of a platea in the eastern half of the state, Colorado is heavily mineralized throughou the mountains, but as a rule the geological conditions are not so favorabl to the occurrence of large bodies of copper as in most of the other mountai states. Outside of the Leadville district the most promising copper field seem to be in Larimer and Routt counties. There are copper mines, o mines carrying considerable copper values, in the counties of Boulder, Cha fee, Clear Creek, Costilla, Custer, Delta, Dolores, Eagle, El Paso, Frémon Gilpin, Grant, Gunnison, Hinsdale, Huerfano, Jefferson, Lake, LaPlat Larimer, Mesa, Montrose, Ouray, Park, Pitkin, Routt, Saguache, San Jua San Miguel, Summit and Teller.

Larimer county shows numerous copper deposits near the Wyomin line, the Pearl district, lying about 20 miles southeast of Encampmen Wyoming, being the most important. The geology of the Pearl district i much the same as that of Encampment, except that quartzite is lackin the prevalent rock formation being granite masses cut by pegmatite dyke The ore is mainly chalcopyrite, associated with considerable quantities o sphalerite.

The Silverton mines of San Juan county produce considerable coppe ore as a by-product from silver mines, San Juan county, ranking secon

to Lake county in the state, as a copper producer, with an average yearly output rising two million pounds of fine copper.

CONNECTICUT. The first copper mine in the United States was opened at Granby, Hartford county, Connecticut, in 1705, this being the Newgate mine. The Bristol mine in the same county also was a producer. The Bristol yielded mainly chalcocite, bornite and chalcopyrite, with a little malachite from the upper portions and was opened in a fault zone between gray gneiss, hornblende schist and Triassic sandstone. Native copper is noted at Farmington, in the same county, and there are occurrences of copper ore at New Britain and Simsbury, the latter being cupriferous pyrites, which also occur in Hartford county. Native copper occurs at Farmington, in red sandstone. A 200-pound mass of native copper has been found in alluvium, near New Haven, and there are sulphide copper ores at Carmel Centre and Cheshire, in New Haven county. Copper ores are noted also at Brookfield in Fairfield county, Roxbury in Litchfield county, Middletown in Middlesex county, Bolton in Tolland county, and Montville in New London county.

DELAWARE. No workable deposits of copper ore are known in this state, but chalcopyrite has been found in a granite quarry on the Brandywine river, near Wilmington, New Castle county.

FLORIDA. Small veins of sulphide copper ores are reported from several points in Florida, but no workable copper deposits are known.

GEORGIA. A little copper mining was done in the Ducktown belt, circa 1870-1875. Fannin county carries the eastern extension of the Ducktown copper belt of Polk county, Tennessee, and the No. 20 mine, between Pierceville and Frytown, has a 20-foot vein of sulphite ore giving assays of 1 to 30 per cent. copper, and with the usual oxidized ores in the upper portion.

Lincoln county has gold, silver and copper ores at various points. The Seminole mine has three veins in a 300-foot shear zone in mica-schist, cut by diabase dykes. The ore is chalcopyrite, associated with galena, sphalerite and pyrite, in chutes averaging about 3 feet with a maximum width of 8 feet. The richer ores carry seven to twenty dollars gold and silver per short ton.

The Chestatee mine, six miles from Villa Rica, in Carroll county, has a bedded vein of cupriferous pyrite 20 to 30 feet in width, with pay-streaks along either wall, and has an outcrop traceable for about 2,000 feet. This vein is said to assay about 3 per cent. copper, but probably does not average more than about half that amount.

In addition to the occurrences noted in the preceding counties, copper ores are found in the counties of Cherokee, Haversham, Rabun and Wilkes.

IDAHO. Copper was discovered in Idaho in 1864, but very little actual mining was done for the metal until 1890. Copper ores are noted in the counties of Bannock, Bear Lake, Bingham, Blaine, Custer, Idaho, Kootenai, Lemhi, Nez Perce, Owyhee, Shoshone and Washington.

The Cœur d'Alene copper belt adjoins the lead belt on the south and east in the vicinity of Stevens Peak, and extends through Shoshone county, Idaho, into Missoula county, Montana. Although silver-lead mines have

been worked for years in the western part of the Cœur d'Alene belt, no serious attempts at copper mining were begun until 1898. This district now has one considerable producer, and a number of developing mines of promise. The Snow Storm mine, on Stevens Peak, near the Montana boundary, shows an impregnated cupriferous zone conforming to the bedding planes in Algonkian quartzite. The ore body, as developed, is 10 to 35 feet in width and upwards of 400 feet in length. The usual oxidized ores above are succeeded by chalcocite and bornite, disseminated in quartzite, with occasional bodies of chalcopyrite. The ore body as a whole averages about 4 per cent. copper, 6 ounces silver and $2 gold per short ton, the ore being highly siliceous and devoid of iron and alumina.

The Seven Devils and Snake River copper districts lie mainly in Washington county, Idaho, though with extensions on the west into Baker county, Oregon. These districts have been worked spasmodically since about 1888, the lack of adequate transportation facilities precluding regular operation. The Seven Devils district shows numerous copper deposits, over a considerable area. There is an extensive series of Triassic basic lavas, with intercalary slate and limestone, intruded by diorite, all of the igneous rocks being cupriferous, ores occurring mainly as primary and secondary sulphides, largely the latter, in fissure veins, contact veins and impregnation zones, most of the ore bodies carrying considerable garnet, epidote and calcite. In the Snake River district the ores are mainly malachite, bornite and chalcopyrite, occuring usually as contact deposits between limestone and dioritic rocks, garnet and epidote being characteristic associated minerals.

In the vicinity of Mackay, in Custer county, there are several mines, of which one is of some importance. Much work has been done at this point, but the best results were not secured, owing to the vacillating policy of the principal company. The ore is of low average grade, but exists in large quantities.

Bannock county, in the extreme southeastern part of the state, shows copper ores, occurring in veins and lenses in greenstone, schist and conglomerate near limestone, the ores being both auriferous and argentiferous.

Copper ores are noted at various points in Lemhi county, notably in the Black Bird district, about 30 miles west of Salmon City, where there are well defined fissure veins, and an impregnation zone in mica-schist intruded by granite.

ILLINOIS. Float copper, in alluvium brought from the Lake Superior district by glacial action, is of rather common occurrence in Illinois, and deposits of copper ore in place have been found in the counties of Chittenden, Hancock and Hardin.

INDIANA. Occasional small pieces of native copper, brought in drift from the Lake Superior district, are found in alluvium in this state. The occurrence of copper ore in an oil-well drilled six miles northwest of Marion, Grant county, was reported, but not verified, in 1904.

IOWA. The only reported occurrences of copper in Iowa are occasional small pieces of native metal found in drift, evidently brought by glacial action from the native copper deposits of Lake Superior. It is probable

that occasional chalcopyrite would be found in lead mines near Dubuque if a close watch were kept for such ore.

KANSAS. Occasional chalcopyrite is found in the lead and zinc mines of Galena, Cherokee county, in southeastern Kansas. The rock strata of Kansas range from Carboniferous to Tertiary, but igneous rocks being lacking, there seems slight likelihood of the existence of copper deposits of commercial importance.

KENTUCKY. Chalcopyrite occurs in Livingston and Union counties, and copper ore was reported, in 1902, from the vicinity of Richmond, Madison county, but none of these occurrences seem of commercial importance.

LOUISIANA. The only known occurrence of copper ore in this state is in a peak deposit of galena, sphalerite and barite, in halite, on Belle Isle, near the mouth of the Atchafalaya river, in Iberia parish.

MAINE. There are occurrences of copper ore in the counties of Hancock, Penobscot, Sagadhoc and Washington, there being old copper mines near Calais, Washington county, on the New Brunswick border.

Occurrences of copper are noted in Brookville, Sullivan, Blue Hill and Franklin, in Hancock county, the more important being in the vicinity of Blue Hill, where there have been about a dozen attempts at actual mining, mostly unimportant, though several small mines were opened. This county had a copper mining boom, circa 1877, at both Blue Hill and Sullivan, mining being suspended about 1884, on account of the low price of the metal. The copper slump of 1907 came just in time to nip in the bud an attempt at reopening some of these old mines. At one time there were two mining exchanges in Bangor, but at last accounts these buildings were occupied as a saloon and barber shop, respectively. The Blue Hill ores were claimed to run 5 to 30 per cent copper, with an average of 10 to 12 per cent, which obviously is a great exaggeration, and the ores were claimed to average $12 to $15 gold per ton, also an obvious exaggeration. The old waste-dumps are said to average 3 to 4 per cent. copper.

MARYLAND. Small copper mines were operated in Maryland in colonial days and during the first half of the Nineteenth Century, the copper industry of Maryland being of some importance until the suspension of mining was brought about by the discovery and exploitation of the Lake Superior mines. The copper ores of Maryland are mainly chalcopyrite, with occasional chalcocite and bornite, and a small amount of malachite. There are three copper belts, in the three counties of Baltimore, Carroll and Frederick.

The most important copper district of the state is in Frederick county, where there is a cupriferous belt running along the Linganore hills, from New London northward to a point beyond Libertytown. This district shows chalcopyrite with occasional chalcocite and bornite, in dolomitic limestones and micaceous schists.

The second district, in Carroll county, is a fault-zone, traceable by occasional outcrops for a distance of about 25 miles, the principal operations of the past having been between Sykesville and Finksburg. The predominant rock form is slate, and the ore is mainly chalcopyrite, with some chalcocite and bornite.

The third district, in Baltimore county, shows copper ore within the city limits of Baltimore, but the principal mines are found at Mount Washington, in the Bare Hill district, a few miles northwest of Baltimore, where there is a vein of 2 to 5 feet width, in hornblende gneiss, near intrusive peridotite.

MASSACHUSETTS. In this state copper ore is noted in the counties of Berkshire, Essex, Franklin, Hampden, Hampshire, Norfolk and Worcester. A little native copper is found in some of the Triassic sandstone strata, and a little chalcopyrite is found in the lead mines of Southampton, in Hampshire county. In Franklin county, the Davis pyrite mine has been worked for sulphur values since circa 1880. Two miles west of the Davis mine is a Savoy schist, carrying a fahlband of 15 to 20 feet width and 750 feet apparent length, with a paystreak on the north wall carrying chalcopyrite. Chalcopyrite also is noted about 10 miles west of the Davis mine, in Hampshire county. At Sheldonville, Norfolk county, a 94-foot shaft was sunk, circa 1901, on a quartz vein in granite, carrying values in gold, silver and copper.

MICHIGAN. The Lake Superior copper district of Michigan was the first American copper field of importance and now is one of the oldest of the leading copper producing districts of the world, as well as the third in size of output. It is the lowest in average grade of any successful copper mining district, and probably contains the most copper of any single field. While the cupriferous Keweenawan formation of Lake Superior outcrops to the eastward in the district of Algoma, Ontario, and to the westward traverses northern Wisconsin and is found in several of the eastern counties of Minnesota, the developed and productive mines lie wholly within the limits of Michigan.

Apparently the aboriginal inhabitants of what is now the United States were entirely unacquainted with bronze or brass, and made but slight use of copper at the time of the discovery of the new world by Columbus, though both copper and bronze were used extensively at that time in Mexico, where the superior Aztec civilization flourished. There are extensive remains, however, of mining done in the Lake Superior district by some race preceding the North American Indians. This people, whose civilization was of a higher order than that of the races succeeding, is known vaguely as the mound-builders. By this long-gone race, many of the Lake Superior copper beds were mined to shallow depth, for mass copper, and at perhaps a majority of the early-day mines, opened around the middle of the Nineteenth Century, there were pits and other evidences of prehistoric mining, to a greater or less extent. That they were good judges of mineral values has been proven by the making of good modern mines under many of these ancient pits. The Ojibways, who were found in possession of the southern shore of Lake Superior by the first white man penetrating to this inland sea, were but slightly acquainted with the practical use of copper, and had no legends regarding the mining done by their predecessors.

The existence of native copper on the southern shore of Lake Superior was first published to the world in a book by M. Lagarde, issued in Paris, in 1636, though it is probable that the existence of the metal was known only from the statements of the Indians to early French explorers on the

lower lakes. Truchement Bruslé is quoted in this book as having in his possession an ingot of copper secured from the Huron Indians. It is probable that Bruslé's ingot was merely a small mass of native copper.

The next notation of Lake Superior copper deposits is found in the Jesuit Relacions for 1659 and 1660. At that time the Ojibways had a few crude utensils made from copper, but the metals in their possession were mainly rough lumps, which the Jesuits said were worshipped, but which, in all likelihood, were merely venerated as unusual works of the Gitchee Manitou.

In the Jesuit Relacion for 1666-1667 is a chapter giving the journal of the exploration of Lake Superior by Father Claude Allouez, who seems to have been the first white man who, of a certainty, saw copper along the southern shore of the lake. In quick succession Lake Superior was visited by Fathers Marquette and Mesnard, and, as a result of their efforts, missions were established for the conversion of the natives. It was nearly another hundred years, however, before white men other than the Jesuit missionaries and French voyageurs and couriers du bois saw the shores of this remote and mysterious body of water.

In 1770 Capt. Jonathan Carver printed a book, in London, telling, among other things, of the native copper of Lake Superior, which, according to his account, could be had merely for the trouble of picking it up. This publication led to the formation of a mining company in London, and Alexander Henry, an adventurous Englishman, who was in turn hunter, trapper, explorer and miner, directed the operations of a party of English miners, who drove a long adit into a claybank beside the Ontonagon River, on property now owned by the Victoria mine, during the winter of 1771-1772. The spring rains caused the caving of the adit, and no further attempts at copper mining were made for seventy years.

When the treaty of Paris brought peace between the United States and Great Britain, Benjamin Franklin, who had heard of the mineral wealth of Lake Superior, deflected his pencil a trifle to the north, upon the crude map that was made the basis of delimitation, and thereby secured to the possession of the United States bodies of copper and iron that since have yielded those metals to the value of more than one thousand million dollars. Some effort was made by the American government, in 1798, to secure definite information regarding the Lake Superior copper deposits, and, in 1826, the Ojibways ceded their mineral rights to the United States government.

In 1830 the lake was first visited by Dr. Douglass Houghton, a young scientist combining rare technical skill with high courage and indomitable energy. Through his efforts was made the first survey of the Upper Peninsula of Michigan, comprising more than two-thirds of the southern shore of Lake Superior.

The first miners to reach the Lake Superior copper field were Jim Paull and Nick Miniclear, two backwoodsmen who came overland from southern Wisconsin in midwinter, suffering great hardships, and arriving on the shore of the great lake in March, 1843. Later in the same year a land office was opened by the Federal government at Copper Harbor, and a number of prospectors reached the field. The early mining locations were of immense area, and overlapped in a most haphazard and ridiculous

manner. Confusion grew until the government adopted the expedient of selling the mineral lands outright.

In 1844 other mineral seekers, mainly devoid of practical knowledge, arrived in the district, and the news of important discoveries became bruited about. In this year arrived the first Cornishmen, who were the first real miners to reach the district. The first actual mining of copper was done in 1844, the original product being a few tons of ore, called black oxide, but possibly chalcocite, taken from a fissure vein near Copper Harbor. This vein was abandoned quickly, but the same company opened a fissure vein carrying native copper, and begun the payment of dividends in 1849, since which year dividends have been paid annually by Lake Superior properties. Shortly after the opening of the Cliff mine, in Keweenaw county, the Minnesota mine was opened in Ontonagon county, at the other end of the district Cross-fissures only were worked at first, but these, while producing several highly profitable mines, have pinched out or lost their workable values at 2,500 feet or less in depth. The stratified beds, on which all the productive mines of the present day are developed, were neglected in the early years, and the Portage Lake district of Houghton county, now much the most important portion of the field, was neglected because of the few fissure veins found crossing the stratified beds. The first successful mining on cupriferous beds was done by the Quincy, which made a success of an amygdaloid lode, and gradually other amygdaloid beds were developed. The first successful mine to be opened on a conglomerate bed was the Calumet & Hecla, in 1866, which remains the largest and most profitable mine of the Lake Superior district, and has paid greater dividends than ever declared by any other mining company in the history of the world, these exceeding one hundred millions of dollars.

The first efforts at smelting were made in 1846, when a small furnace was built, by Prof. Jas. T. Hodge, on the Gratiot river, in Keweenaw county. This ran for two short campaigns only, as selected copper rock, assaying about 20 per cent. metal, gave smelter returns of only 3.5 per cent. copper, showing that nearly five-sixths of the metal was lost in the slags. A second furnace was built about 1847, by the Suffolk Mining company, seven miles southeast of Eagle River, but this was not a success. In 1849, a third furnace was built, on Isle Royale, but never put in commission. Until about 1850 all lake copper was smelted in Baltimore, but in that year J. G. Hussey & Co. built a copper smelter at Cleveland, and a smelter was built in Detroit in the same year, and shortly thereafter a successful local smelter was built at Hancock, in Houghton county. About 1863 a smelter was built at Ontonagon, and previous to 1867 a small and unsuccessful smelter was built at Lac La Belle, in Keweenaw county. The Calumet & Hecla smelter, at Hubbell, was built in 1886, the Dollar Bay works in 1888, the Quincy smelter in 1898 and the Michigan smelter in 1904.

The Keweenawan formation in Michigan may be divided into four parts, the first including Keweenaw Point at the eastward, the second comprising the Portage Lake or central district, which includes the Calumet and South Range fields, and practically Houghton county, while the mines of Ontonagon county, and the trans-Ontonagon extension in Ontonagon and Gogebic counties comprise the third field. The fourth district is Isle Royale, nearly all of the island showing cupriferous beds, with many old and idle mines, mainly small.

The richest cross-veins of Keweenaw county were at the western end, the most notable being developed by the Cliff, Central and Phœnix mines, The fissure veins of Keweenaw county usually cross the stratified beds at approximately right angles. The most promising copper ore body of the Lake district was opened, circa 1845, on the northeastern side of Bohemian Mountain, and some ore therefrom was shipped to Swansea. The ore was mainly bornite, with some massive chalcopyrite, occurring in an 18-inch vein. There are narrow fissure veins of ore, mainly arsenical, in the Mohawk mine of Keweenaw county, and also in the South Range mines of Houghton county. Chalcopyrite has been found in the Huron shafts of the Isle Royale mine, at Houghton, and at Copper Harbor, in Keweenaw county, two shafts were sunk, to a depth of about 20 feet each, on what was believed to be melaconite, and about forty tons of ore were extracted therefrom, the deposit apparently being merely a pocket. The green stains of malachite are found in many cupriferous beds, in the partly decomposed portions at or near surface, but it is altogether probable that the carbonates were evolved from native copper by weathering

The Lake Superior copper formation, at least four hundred miles in extreme length, with one hundred and fifty miles in Michigan, on which more or less mining has been attempted, and about one hundred miles on which actual mining and development work is in progress, consists of a series of stratified beds, resulting from old lava flows. The Keweenawan series is a succession of extrusive lavas, more than two hundred in number, with intercalations of conglomerate, about thirty in number, and occasional intercalary sandstones. This formation has an average thickness of 25,000 to 30,000 feet in the main series, with a secondary series of conglomerates and sandstones outcropping in the Porcupine Mountains of Keweenaw county. Overlying the Keweenaw series, to the north and west, is a conformable sandstone, while to the east and south is an unconformable sandstone, equivalent in horizon to the Potsdam sandstones at the top of the Cambrian series. The Keweenawan series is of Algonkian age, and at the base of the Azoic or Archæan system, lying above the Huronian ferruginous series, with a fault against which the copper strata are tilted. The entire series of beds, including both traps and conglomerates, has been tilted to angles varying from 20° to 72° with the horizon. The overlying sandstone shows small specks of copper, not in workable quantities, while the underlying unconformable sandstone shows occasional impregnations of native copper, and apparent evidence of igneous metamorphism, near the point of contact.

The Keweenaw Peninsula rises to an extreme height of nearly 800 feet above the waters of Lake Superior, and it is supposed that it once formed the shore of a sea, over which poured vast floods of lava, gradual subsidence bringing the lava beds beneath the sea. The conglomerates were supposed to be of sedimentary origin, but this supposition calls for no less than thirty subsidences and emergences of the Keweenawan series, which seems a strain upon the imagination, especially as there are only occasional patches of sandstone in place of the considerable beds that might be looked for in connection with the conglomerates, though some of the conglomerates shade into sandstone in spots, and the upper series of the Keweenawan formation, not mined at present, shows thick beds of sand-

stone, some of which are cupriferous. It is probable that the conglomerates are partly tuffs of volcanic origin, though some undoubtedly are ancient sea-beds, formed by material laid down from rocks broken from adjacent shores. The Keweenawan series forms a syncline, of which the southern edge outcrops on the Keweenaw Peninsula, with dip to the north and northwest. The northern fold of the series outcrops on Isle Royale, with dip to the southeast. The axial line of the syncline runs somewhat north of east, but there is a marked divergence in the trend of the southern outcrops along the district where the principal mines are opened, the strike of the formation being approximately North thirty degrees East, in the Houghton county field, which produces nearly nine-tenths of the total copper output of the Lake Superior district.

Toward the middle of the Keweenaw Peninsula the western sandstone is lost under the lake, and at Bete Gris Bay the eastern sandstone also plunges beneath the waters, leaving the Keweenawan series in sole possession of the eastern tip of the peninsula. The eroded edges of the solid rock formations of the Keweenaw Peninsula usually slope, under glacial drift, to the shore lines. The district was glaciated from northeast to southwest, at a comparatively recent age, when considerable drift was deposited in the lower portions of the surface, much of the district being covered with sand, gravel and boulders ranging from a few feet to three hundred feet in depth. As a result of glaciation and erosion the harder strata, notably the greenstone of Keweenaw county, outcrop prominently, and there are moraines at various points on the southern and eastern side of the peninsula, with quicksands that are difficult to sink through. In many places, especially at the crests and escarpments of crystalline igneous strata, the naked rock stands out strongly, but the lower portions are covered with drift. From Keweenaw Point toward the south and west there is a considerable thinning of the flows, with a corresponding thickening of the conglomerates. In addition to the main series of the Keweenawan belt, consisting principally of eruptive rocks, where is a second series, mainly of sedimentary rocks laid down at a later period, this second series being found in the Porcupine Mountains of Keweenaw county, and apparently resulting mainly from the breaking down of the eruptive rocks of the preceding formation, with redeposition of detrital material so secured, in the form of conglomerates and sandstones, mainly the latter. Rich cupriferous conglomerate float has been found from time to time in the Porcupine Mountains, but the bed has not been found in place. The Nonesuch shales and sandstones of the Porcupine belt contain very finely comminuted copper, with occasional silver.

The Keweenawan formation shows extensive fissuring, more notably in the middle and eastern portions of Keweenaw county, and there is considerable faulting. The longest throw that has been noted is 284 feet, on the east vein of the Central mine, in Keweenaw county, along the Kearsarge conglomerate, estimated as equivalent to a movement horizontally northward of more than two and one-half miles.

The dip of the strata of the Keweenawan series varies greatly from point to point along the strike, and in any given cross-section is sharpest along the eastern sandstone, and flattest along the western sandstone, an evidence of thrusting exerted from the direction of the eastern or Potsdam sandstone. The contact between the Keweenawan rocks and the eastern

sandstone shows the latter much tilted from the horizontal position occupied a short distance further east, the sandstone standing almost vertically at some points adjoining the eruptive rocks. At the Delaware mine, in Keweenaw county, the average dip of the Keweenawan beds is about 20°; at the Arnold mine, about 25°; at the conglomerate mine of the Calumet & Hecla, in northern Houghton county 37° 30'; at the Osceola mine, 41°; at the Franklin Junior mine, 47°; at the Quincy mine, 51°; at the Arcadian mine, 53°; at the old Atlantic mine, 54°; at the Isle Royale mine, 59° and at the Baltic mine, 72°.

The Keweenawan series, in Houghton and Keweenaw counties, may be divided lengthwise into three approximately equal parts. The flows of the upper third, lying to the north and west, have developed no paying mines. In the second series, including the beds approximately from the Atlantic to the Osceola amygdaloids, there are a number of successful mines, including the conglomerate mine of the Calumet & Hecla, while the lower third includes the Kearsarge and Baltic amygdaloids, which have shown the greatest persistence in retention of payable mineral values along their strikes, of any of the cupriferous beds yet opened in the Lake Superior district.

In the matter of arsenic, which is a deleterious element that is giving considerable trouble to many of the Lake mines, there are certain rules that seem to hold good in most cases, though with possible exceptions. The first of these rules is that arsenic increases with depth. In the cases where no arsenical cross-veins have been noted in the mines affected, it is possible that the increase of arsenic comes from the gangue. The second rule is that there seems, in the district from Portage Lake to the southern end of Keweenaw county, an increase in arsenic from south to north. The third rule, which is based on indubitable evidence, is that in any given cross-section the percentage of arsenic in the copper secured increases from the upper to the underlying flows, in a fairly steady ratio, the copper produced from the felsitic beds at the base of the series being notably arsenical.

A cross section of the Keweenawan series at any given point would show a large number of trap and conglomerate strata, varying greatly in thickness and of unusual persistence both as to length and depth. There necessarily must be an end to even the most extensive lava flow, and owing to inequalities existing on the land-surface and sea-bed over which these old flows were spread, any given stratum may be cut out temporarily, to reappear, at greater depth, or to either or both sides of the point of disappearance. The conglomerates afford the geological bases of measurement for the series, these being much more readily distinguishable than the trap beds, owing to cleaner walls and divergence in appearance from the surrounding and more numerous trap strata, and the correlation of cupriferous beds by means of measurements of the conglomerates has made great progress during the past decade. The conglomerates are composed of rounded pebbles of igneous rock, cemented mainly by reddish and yellowish particles of quartz-porphyry. The Calumet & Hecla conglomerate is felsitic. Of the conglomerate beds many carry copper in minute quantities, but only two have been mined seriously, these being the Calumet and Allouez conglomerates, of which the former has made the greatest mining success of the district, while the latter has been, on the whole, a failure.

The lava flows of the Keweenawan series have experienced long continued metamorphic action, producing amygdaloidal structures in the upper portions of the various beds, and these amygdaloidal portions of the trap flows, mainly melaphyrs, carry native copper as replacements of amygdules leached out, as irregular masses in beds or along contacts between different strata, and in fissure veins. Nearly all of the amygdaloids carry some copper, but the majority are too low in tenor to be workable.

The lava flows, as a rule, are composed of dark basaltic rock with the texture of diabase. Felsite rock are of rare occurrence, except in the lower part of the belt, the basal series being felsitic. The chief original minerals are felsite, augite, magnetite and olivine, the typical rock containing about 55 per cent. felsite and 30 per cent. augite, the balance being composed of magnetite, olivine and allied secondary minerals, the base of each flow being more augitic than the amygdaloidal upper portion. Of the basaltic rocks an average type would contain about 45 per cent. silica, 15 per cent. alumina, 13 per cent. iron oxide, up to 10 per cent. calcium, about 10 per cent. of combined sodium and magnesium, and one to two per cent. each of carbon dioxide, titanic oxide and water. According to Lane the formula of the average amygdaloidal rock, deprived of its copper, might be written $CaO.\ MgO.\ Na_2O.\ FeO.\ (Fe,Al)_2O_3.\ 4SiO_2$. Both amygdaloids and conglomerates carry much epidote, and other minerals, notably calcite, occur in connection with copper, calcite crystals that carry occluded crystallized native copper being fairly common, while some occurrences are among the largest and most perfect specimens of crystallization afforded by the mineral world. In the typical amygdaloids there are considerable quantities of prehnite, laumonite and other related silicates.

The genesis of the native copper deposits of Lake Superior remains obscure, and none of the theories provided by scientists is absolutely satisfactory, though synthetic laboratory experiments lend corroborative evidence to the theory more commonly accepted that the metal was deposited in native form from sea-water, where it had been held in solution. Dr. Koenig has found mine-waters depositing copper at the bottom of the Quincy mine, where the waters are strong brines, carrying considerable bromine. In the upper workings of the Lake Superior mines, to a depth of about 1,000 feet, the mine-waters are soft, or slightly hardened by sodium silicate. Below this depth the waters become briny with sodium chloride and calcium chloride, the latter increasing rapidly with depth, while below a half-mile the mine-waters contain a few grams of copper chloride per ton, and deposit copper therefrom as opportunity offers. Carbon dioxide is lacking almost entirely from the deep mine waters of the district. It seems probable that the native copper was deposited by sea-waters from sulphide solutions through chloride reactions. Such a reaction has been found in nature in New Zealand, where the sulphide ores of a mine abandoned for forty years were found partly transformed to native copper, by the action of the sea, which had broken into the workings. Another theory, quite commonly held, is that the metal was included originally in the magma of the basic lavas and was deposited in its present form by local concentration and metasomatism. Lava flows somewhat similar to those of the Keweenawan series carry native copper in Alaska, Newfoundland and elsewhere.

Metallic copper is found in all rocks of the Keweenawan series, including the superimposed western sandstone, and along the contact of the unconformable eastern sandstone as well, but excepting the sedimentary secondary series of the Keweenawan belt, in the Porcupine Mountains, none of the sandstones contain copper in workable quantities. The metal is found in both traps and conglomerates of the main series, the metal of the conglomerates occurring largely as cementing material. Copper occurs occasionally in the very dense trap rocks, but is found more commonly in the more open upper portions of the trap flows, where the amygdules have been leached out and replaced to greater or less extent by the native metal. It is obvious that the amygdaloidal portions of the flows were much more suitable for the physical reception of the metal than the extremely dense traps at the base of each flow.

In the amygdaloidal cupriferous beds the copper usually favors either the foot or hanging wall, but occasionally, in wide beds, occurs in streaks toward the centre, and usually is disseminated more or less irregularly through the entire width of the amygdaloid, but, with a tendency, perfectly natural in view of the physical structure of the amygdaloidal traps, to favor the hanging wall. Occasionally the mineralization is so strong that the dense basal portion of the superincumbent trap flow forming the hanging wall has been impregnated with fine copper for a few inches, or even for a number of feet, and is found workable for its metallic values.

The percentage of copper contained in the rock decreases in all mines opened to more than 4,000 feet in depth. As a rule, the amygdaloid mines usually show decreased values below a depth of about one-half mile. The payable cupriferous beds show copper courses in practically all instances, these being diagonal chutes of richly mineralized ground descending on the plane of the bed with a rake about midway between the strike and dip. Apparently the beds themselves will continue, in practically all cases, to much greater depth than mining is possible. The ultimate depth of mining cannot be foretold with any certainty, in view of the steady progress that is being made in knowledge, methods and equipments. The deepest mines of the world are in this district, the Tamarack having a vertical shaft of nearly one mile depth, while the Calumet & Hecla has a shaft sunk at an angle of 37° 30′ that is 8,100 feet in depth, with a winze of 190 feet sunk from the drift on the bottom level of this shaft. The great heat and briny waters found at the bottoms of the deep mines render work somewhat difficult, and these factors, combined with increased hoisting and mining costs, coincident with decreased copper contents, must, of necessity, eventually furnish a bottom for even the most ambitious of mines.

Considerable silver is carried in connection with copper in many of the Lake Superior mines. The mines of the Evergreen belt, in Ontonagon county, are the richest in silver, followed by the mines in the immediate vicinity of Portage Lake in Houghton county. The silver is mechanically admixed with the copper, but the two metals are not alloyed.

Various theories of cross-sectional mineralization in zones are held by students of this field, but none of them have been fully elaborated, and, while there seems some basis for such theories, there are conflicting features precluding their full acceptance at present.

Throughout the native copper district of Lake Superior there are puzzling magnetic earth currents, these being most marked on Isle Royale

and near Duluth, and the aberrations of the mariner's compass are such that navigation is rendered somewhat difficult, and even dangerous, at times. In this connection it may be stated that the first wireless telegraphy was done in Ontonagon county, Michigan, by Ayers Stockley, shortly after the laying of the first successful Atlantic cable in 1866. Mr. Stockley used crude home-made apparatus, but succeeded in transmitting telegraphic messages correctly, for a distance of nine miles, by utilizing the magnetic earth currents traversing the cupriferous strata.

While practically the entire copper production of Michigan is from the native metal, nearly all of the principal commercial copper ores are found in the native copper district, and copper ores are found in many other counties of the Upper Peninsula of Michigan. The list of Michigan copper ores includes cuprite, melaconite, azurite, malachite, chalcocite, bornite, chalcopyrite, chrysocolla, algodonite, domeykite, whitneyite, mohawkite and keweenawite.

The active copper mines of Michigan are in the three counties of Keweenaw, Houghton and Ontonagon, with a considerable number of old and idle mines in Isle Royale county. The Keweenawan copper belt extends to the Wisconsin boundary through Gogebic county, and small quantities of chalcopyrite are noted in several of the iron mines of this county.

In Baraga county there is an isolated outlier of the Keweenawan formation, known as Silver Mountain, and the same formation, carrying native copper, is noted on the Huron Islands.

Native copper is said to have been found near Perkins, Delta county, but the discovery does not seem of commercial importance.

Native copper, evidently brought by glacial action from the Keweenawan measures to the north, has been found in drift above the iron ore body of the Cyclops mine, at Norway, Dickinson county, and chalcopyrite is noted in small quanties in connection with hematite in the Emmett mine, and also in the Chapin mine at Iron Mountain, in this county.

Copper ore has been reported from the vicinity of St. Ignace, Mackinaw county, but the occurrence has not been fully verified.

In Marquette county chalcopyrite and native copper occur on Presque Isle, in the city of Marquette and chalcocite is noted on Mount Mesnard and on the Chocolay river, near the same town, while a variety of copper ores occur near Sauks Head. Small quantities of copper sulphides are found in the gold mines north of Ishpeming, and the granite rocks extending from the serpentine lying north of Ishpeming to the shore of Lake Superior show numerous gash veins carrying copper ores and other minerals.

In Menominee county copper ores have been found near Carney, and some attempts at mining have been made thereon.

MINNESOTA. The western continuation of the Keweenawan cupriferous series extends from the Upper Peninsula of Michigan across northern Wisconsin into Minnesota The northern fold of the Keweenawan syncline is noted in Cook and St. Louis counties, north of Duluth, where attempts at mining have been made. There also are promising bodies of sulphide copper ore, near Lake Superior, in this county. In St. Louis county, in 1900, a mass of native copper in sheet form, weighing about 100 pounds, was found embedded in iron ore, at a depth of 300 feet below the surface, in the Montana shaft of the Minnesota Iron Co.

The southern fold of the Keweenawan syncline extends into Pine and Chisago counties, shortly north of St. Paul and Minneapolis, and several tentative efforts at mining have been made in these counties, native copper being found near Hinckley, Pine county, and native copper and malachite occurring in Chisago county.

MISSOURI. This state has a producing copper mine in Madison county, and has old mines or attempts at mines in the counties of Benton, Clare, Cole, Cooper, Crawford, Dade, Dallas, Dent, Franklin, Greene, Iron, Lawrence, Maries, Ste. Genevieve, St. Francois, Shannon and Washington, and also shows copper ores in the counties of Jasper, Jefferson and Wright. Copper ores are noted mainly along the Ozark uplift, in the southern part of the state, and in the lead district of southeastern Missouri.

The first copper production of Missouri was made in 1837, from carbonate ores, and at various times smelters have been erected in Crawford, Madison, Ste. Genevieve and Shannon counties. Franklin county once had a small copper producer, near Sullivan, but the output was very small. Native copper and various ores are found in the Stanton mine in this county.

In the Circle Diggings of Cole county, malachite, azurite and chalcopyrite are found, and a limited production has been made from this district.

The Collins mine, in Cooper county, shows chalcopyrite and carbonate ores.

The Cherry Valley mines of Crawford county have produced a small quantity of malachite.

In the zinc and lead mines of Jasper county a little chalcopyrite and occasional native copper occur in connection with sphalerite.

In Ste. Genevieve county, near the Mississippi river, attempts at mining were made previous to the American Civil War.

Shannon county has sulphide copper ores and in 1901 was the scene of a short-lived copper boom.

The principal copper mining operations of both past and present are noted in Madison county, in southeastern Missouri, which long has been an important lead field, being the site of the Mine La Motte, the oldest American lead mine west of the Alleghany Mountains. In 1863 copper mines were opened at Cornwall on parallel blanket veins of disseminated chalcopyrite with cherty gangue, having a country rock of Silurian limestone, and some little production was secured from this property. Chalcopyrite is noted occasionally in connection with sphalerite, pyrite and small quantities of nickel and cobalt sulphides, in the Mine La Motte. To the southward of the Mine La Motte, and about two miles east of Fredericktown, is the Buckeye mine of the North American Lead Co. On this tract the Buckeye copper mine was opened in early days, and produced a little ore. The present company opened a new mine, for lead, but at depth this mine yielded an increasing quantity of chalcopyrite, and this ore became so common that a smelter has been erected for its treatment. The chalcopyrite averages about 6 per cent. copper after selection, and carries some nickel and cobalt values, mainly the latter, to the extent of about [illegible] per cent. The country rock in the vicinity of Fredericktown is limestone of various ages from Carboniferous to Cretaceous, with bosses of intrusive granite-porphyry, the ore occurring as irregular contact deposits in the limestone, near the contact with igneous intrusives. I have found some

all directions from Fredericktown, and believe this district to be one of the most promising copper fields between the Mississippi river and the Rocky Mountains.

MONTANA. This state has copper mines or attempts at mines in the counties of Beaverhead, Broadwater, Cascade, Deer Lodge, Flathead, Gallatin, Granite, Jefferson, Lewis & Clarke, Madison, Meagher, Missoula, Park, Powell, Ravalli, Silver Bow, Sweetgrass and Teton. The Butte camp in Silver Bow county is overwhelmingly preponderant in importance, being the largest and most important copper district of the world.

The mines of Jefferson county, which are found principally in the vicinity of Corbin, Clancy and Basin, seem next in promise to those of Silver Bow county, though production is not large as yet.

Missoula county, in the extreme western part of the state, carries the eastern extension of the Cœur d'Alene copper belt of Shoshone county, Idaho, with similar geological conditions, and at present, is a district of small development but considerable promise.

Meagher county has a number of small attempts at copper mines, including copper deposits in shale near White Sulphur Springs.

The Butte camp of Silver Bow county dates from 1863, when placer gold mining was begun. This was followed by silver mining in the following year, and copper was first discovered by crosscutting at depth from the shafts of the silver mines. The increasing percentage of copper in several of the silver mines in the western part of the camp led, in 1879, to the building of the first copper smelter by Senator W. A. Clark, the product being a highly argentiferous copper matte, in which the principal value was silver, the copper being used mainly for a carrier. In 1880 the Parrot and Boston & Colorado mines were making argentiferous copper matte, and in 1881 the great Anaconda mine was opened, treating ore at first that averaged about 30 oz. silver per short ton, the silver bullion being very base and containing about half copper. In 1882, at a depth of about 300 feet, the Anaconda found massive chalcocite in a crosscut, and from this find a considerable shipment of 50 per cent. copper ore was made to Swansea. From that date copper production increased rapidly, while the output of the silver mines has declined, though Butte became a much larger silver producer than ever before, owing to the metal secured as a by-product from the copper mines.

The Butte camp is known officially as the Summit Valley district, but this name is used rarely. The town is in the heart of the Rocky Mountains, and, in addition to being the largest copper camp, is the second largest mining camp of the world, ranking immediately after Johannesburg, while if white population only were counted, Butte probably would lead its South African competitor. In addition to the city of Butte, with nearly 75,000 people, that has grown up around the shafts, the copper industry of this camp supports the smelting towns of Great Falls and Anaconda, with nearly 20,000 people each.

The Butte camp is approximately a rectangle of four by seven miles, but the district as now proven is approximately two miles wide and three miles in length from east to west, the principal production coming from an area that is approximately one and one-half miles north and south by two miles east and west. The deepest shaft of the district is 2,800 feet,

showing good ore on the bottom level. Developments since the beginning of the century have increased considerably the area in which rich mines are opened, and, in addition, work of an exploratory nature has shown promising bodies of copper ore outside of the area formerly considered as including all of the possibly productive ground. The new developments have been mainly to the eastward.

The development of mines in this camp was seriously hampered for many years by the most extensive, bitter and protracted litigation to be found in any mining district, but, happily, this was settled in 1906, by a compromise in which both principals saved face, while benefiting by the cessation of litigation that was costing an average of nearly $2,000,000 yearly.

The Butte district shows an extensive area of igneous rocks of Tertiary age, with later intrusives. The oldest rock is a dark basic granite, or quartz-monzonite, known as the Butte granite, surrounded by altered limestone and other sedimentaries, and partly covered by andesite, the copper veins, so far as known, occurring exclusively in this rock. The Butte granite is cut by dykes of an intrusive, probably of the Eocene period, known as the Blue Bird granite, and aplite of later age. There is a still later intrusive of rhyolite-porphyry or quartz-porphyry, known locally as the Modoc porphyry. The older rocks are faulted by intrusive fracturing, producing fissures with a generally east and west trend. Those were faulted by prolonged volcanic activity, and are cut by intrusive rhyolite, conforming in trend with the dykes. The big butte north of the town, from which the city takes its name, is an eroded remnant of a small rhyolite volcano.

The mineralized veins in the northwestern portion of the camp, which were first to be mined, carry mainly silver and zinc values to the depths yet worked, but there are strong indications of increasing copper values at the bottoms of the deeper shafts. The most productive copper veins, which have a generally east and west trend, give poor surface showings, and, as a rule, are almost entirely barren to depths of 300 to 500 feet, and occasionally to a depth of 1,000 feet. The outcrops of these veins are decidedly unpromising in appearance, and gossans are almost entirely lacking. There are lower fissures, causing displacements of both the cupriferous and argentiferous veins, but these are poorly mineralized, as a rule. The silver veins show rather prominent gossans.

At depth there is a tendency of the wider copper veins to split into smaller parallel veins, separated by country rock that is considerably altered and somewhat mineralized. There also is an increase at depth in the number of smaller mineralized fissures, while some of the fault veins not mineralized in the upper workings carry good values at depth. The veins are very erratic in size, with many pinchings and bulgings from point to point, and with a general tendency toward increasing width at depth, this being followed by forking of the veins. The walls are poorly defined in many cases, and frequently are more of less mineralized. The heart of the Butte district forms almost a gigantic stockwerk.

No important copper district now worked shows such extensive alteration as is noted in the Butte camp. The process of secondary enrichment has been carried on so long, and so actively, that the gossans of the copper veins, undoubtedly large and prominent at one time, have

been lost almost entirely, through the combined effects of leaching and erosion. The leaching process has been so thorough that the principal copper veins show but slight traces of values for hundreds of feet from surface, but, in compensation, the zone of secondary enrichment is the deepest found in any important copper camp, and massive chalcocite, in large bodies, has been found at a depth of 2,400 feet below surface, while the deepest shaft in the district shows secondary sulphides of good average tenor on its bottom level. There is, however, a general tendency toward decreased values with depth, as in all other mining fields, but the greatly decreased average tenor of the copper ores of Butte, as now smelted, is due partly to other factors than actual impoverishment of ore at depth, the most important of these causes being the greater thoroughness with which mineral values are extracted, the scramming of ore left standing from early mining operations, and the vast improvement and cheapening of metallurgical processes, by reason of which it is now possible to work at a profit ores that were absolutely unpayable only a few years ago. The tenor of ore produced by the leading mines, except North Butte, shows a marked decline from the figures noted at the end of the Nineteenth Century, present extraction averaging as low as 2.5 to 3 per cent. copper from several of the more important mines.

The principal copper values of the Butte district are found in chalcocite and enargite, which furnish about 90 per cent. of the total production of the camp. Chalcocite occurs massive, in immense veins, also disseminated in granules. There is considerable bornite, which occurs extensively in the western mines, but is found sparingly in the eastern properties. The mines also produce considerable quantities of chalcopyrite and cupriferous pyrite, with more or less tetrahedrite and tennantite. The large amount of enargite smelted is responsible for the heavy arsenical fumes from the Washoe smelter, it being estimated that upwards of 30,000 tons of arsenic pass off yearly in the smelter fumes from the Washoe works.

The gangue of most of the ore bodies is granitic or silicious, consisting largely of altered country rock. The veins frequently show considerable fluccan, but, as a rule, partings are poorly defined, the ore fading into the country rock, which is impregnated to some distance on either side of the vein. The ores are highly silicious, averaging about 55 per cent. silica, 15 per cent. iron oxide and 10 to 15 per cent. sulphur, the high grade ores ranging 5 to 15 per cent. copper, with an average tenor of about 6 per cent., while 90 per cent. of the production of the district, excepting North Butte, is concentrating ore averaging 2 to 4 per cent. in copper tenor.

In addition to the ore bodies now worked there are immense deposits of ore of a grade still lower, and of a tenor too low to permit profitable working at present, though it is probable that eventually these ores will be extracted and treated at a profit.

While the Butte district has shown a marked tendency toward decreased values within the past decade, a similar tendency is noted in most other districts, and Butte, far from being a decadent camp, bids fair to hold its position at the head of the copper districts of the world for years to come.

NEVADA. This state has copper resources of prime importance

under development, and the Ely field promises to make a copper camp of the first magnitude, while developments elsewhere, notably in the Yerington district, are of promise. The state has copper mines, or attempts at mines, in the counties of Elko, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Lyon, Nye, Storey, Washoe and White Pine. With the improvement in general mining conditions, brought about by the discovery of the gold bonanzas of Tonopah and Goldfield, and the improved facilities given by construction of new railroad lines, copper mining is making substantial progress.

In Esmeralda county the Sodaville and Mina copper districts are at the northern end of the Pilot Mountains, showing a contact zone of about twelve miles length, on the borders of a granite intrusive.

In Humboldt county there are promising copper deposits in the vicinity of Winnemucca, and in the Jackson Mountains, circa 60 miles north of Humboldt.

The Bunker Hill district, in the northwestern part of Lincoln county, shows nickel-copper ores, somewhat similar to those of Sudbury, with an average of about one-third ounce of platinum per ton of ore, in some cases.

The Yerington district, in Lyon county, circa 20 miles southeast of the Comstock lode, is in the Mason Valley Mountains, a small range of about 23 miles length and 5 miles width, with an extreme elevation of 6,500 feet. The core of this district is an intrusive granite, exposed by erosion in the higher peaks and deeper cañons, and covered by metamorphosed sedimentary strata on both slopes, with rhyolite flows along the eastern base. Copper ores occur in fractures and shear zones, and as bedded veins in dolomitic limestone, also as impregnations in limestone of Carboniferous age. The ores found in the dolomitic limestone are mainly oxidized, with quartz and calcite gangue, while the Carboniferous limestone shows mainly chalcopyrite, with a little chrysocolla and covellite in the oxidized zone, but the secondary sulphides, chalcocite and bornite, are found rarely. Owing to the heavy limestone gangue, carrying garnet and epidote, concentration is not effected readily, and the ores must be considered upon a smelting basis. Fortunately ore charges of about two-thirds sulphides and one-third oxides and carbonates are self-fluxing. Water supplies are available from the Walker river and from artesian wells.

In Nye county the Lone Mountain district is roughly eight miles wide by about twenty miles in length, showing at the northern end a monadnock lying about fourteen miles west of Tonopah. This district carries gold, silver, copper and lead ores.

In White Pine county the Robinson district, as it is called officially, but more commonly known as the Ely camp, is a low grade district of very unusual promise. This field, as now proven, is a belt of about one mile width by six miles length, having a generally easterly and westerly trend, transverse to the Egan Mountain range. There is an intrusive monzonite-porphyry of post-Carboniferous age cutting Carboniferous sedimentary strata, with intrusive monzonite dykes, copper deposits occurring in both the monzonite and the sedimentary strata adjoining. The principal ore body is that portion of the monzonite-porphyry lying under the zone of oxidation, and apparently is about 400 feet in thickness. According to

Prof. Lawson the workable ores are tertiary and not secondary, hav resulted from the leaching of the former secondary ores of the oxidi zone. The porphyry mass shows large quartz blowouts that cover nea one-third of the porphyritic area, these occurring mainly along the c tact between the monzonite and limestone. The limestone on the nor ern flank of the porphyry shows small bodies of slightly argentifer lead ore, and on the southern flank of the intrusive monzonite gold o are found, in the sedimentary beds. The monzonite ores of the princi Ely mines sample 2.32 to 2.6 per cent. copper, 0.03 to 0.05 oz. sil and about 40 cents gold per short ton.

NEW HAMPSHIRE. Copper ores are found at a number of poi in this state, especially in Grafton county, where more or less mining been attempted. Occurrences of copper are noted at Bath, Franco Haverhill, Littleton, Lyme, Oxford, Warren and Woodsville in Graf county, near Jackson and Madison in Carroll county, at Westmorela Cheshire county and at Croydon and Unity in Sullivan county.

NEW JERSEY. This state has copper deposits in the counties Bergen, Hudson, Mercer, Middlesex, Passaic, Somerset, Sussex, Union Warren, and more or less mining has been done in several of these co ties, the principal operations having been near Arlington, Griggsto and Somerville. The Schuyler mine near Arlington, Hudson county, the first New Jersey copper mine, and apparently was the second in British colonies that later became the United States. This mine, o eight miles from New York city, was found in 1719 by a negro slave the Schuyler family, which was made wealthy therefrom. The f steam engine in the United States was a pump of the Newcomen ty installed at this mine, and the first machine shop in the country built in 1794 near Belleville, New Jersey, by the owners of this mi and the first American copper smelter was built in connection with mine. The property was a fairly steady producer until the American R olutionary War, and thereafter was worked intermittently, being in hands of an English company for some time after peace was rest between England and the United States. In the Arlington district th are cupriferous sandstones overlying trap beds, with impregnations copper in shale adjoining the trap. Except in Warren county the Jersey copper deposits occur in amygdaloidal traps, and in Triassic s stone and shale adjoining traps.

In Somerset county, in eastern New Jersey, copper occurs in red of Triassic age, associated with intrusive diabase, showing oxidized above, with sulphides occurring at a depth of about 600 feet, while a depth of 600 feet native copper and occasionally chalcocite in bu are found, giving strength to the theory that the oxidized ores abov alteration products from native copper. The main ore bed varies 3 to 15 feet in thickness, and has been traced five miles and worked or less for that distance. At one mine there is an incline shaft of feet in depth. Enough copper was secured from a mine near Bound to cast a brass cannon for the American army, during the Revoluti War.

In Pahaquarry township, on the Delaware Water Gap, in W county, the northeastern slope of the mountain shows red shale Medina sandstones, some of the gray sandstones interbedded wit

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in the underlying porphyry. Although mining has been done in this district for about a century, the workings were merely superficial until a deep shaft was begun in 1906.

The Burro Mountain district of Grant county is the most important in the territory. This field lies about fifteen miles south of Silver City, at the base of the Burro Mountains, and mining dates from 1879. Several small copper smelters were erected in the ninth decade of the Nineteenth Century, but the most important development dates from about 1903. The Burro Mountains are a short isolated range of only about five miles extreme width by ten miles length, showing narrow veins of cupriferous pyrite in porphyry, and associated deposits of disseminated chalcocite, with some ore bodies of unusually large size carrying sulphide ores of low average tenor, frequently zinciferous and refractory. The mineral values occur principally in chalcocite and cupriferous pyrite, with small quantities of gold and silver. The sulphides average 3.5 to 4 per cent. in copper tenor, and there are some oxidized ores, but the zone of oxidation is quite shallow.

NEW YORK. The only copper mine ever opened in the state of New York was at Canton, St. Lawrence county, but this never became an important producer. There are occurrences of ore, however, at numerous other points in the state. Chalcopyrite is found in the Ancram and Beckee lead mines in Columbia county; at Crown Point in Essex county; at Alexandria and Antwerp in Jefferson county; at Salisbury in Herkimer county; at Ladentown, Rockland county, where malachite and cuprite occur in the seams in the trap; at Ellenville and the Red Bridge lead mines in Ulster county; cuprite, azurite, malachite and chalcopyrite occur in the vicinity of Conklingville, Saratoga County; at Chester, Warren county, and at East Chester and Ossining in Westchester county.

NORTH CAROLINA. This state has copper in the counties of Alexander, Alleghany, Ashe, Buncombe, Cabarrus, Caldwell, Catawba, Chatham, Clay, Davidson, Gaston, Granville, Guilford, Jackson, Lexington, Lincoln, Madison, Mecklenburg, Mitchell, Montgomery, Moore, Person, Randolph, Rockingham, Rowan, Stanley, Swain, Transylvania, Wautauga, Wilkes and Yadkin. As a rule the ores occur in mountainous districts near the contacts of basic rocks altered to hornblende-schists, which apparently were the source of the metal, and which still contain small quantities of chalcopyrite and pyrite. The ores of North Carolina are mainly sulphides, but native copper and practically all of the commercial ores of copper, as well as many rare minerals, have been found. Copper mining was followed to a small extent previous to the American Civil War, mainly in Ashe and adjoining counties. The state is notably rich in available water powers, which should prove valuable in the development of its mineral resources.

The Virgilina district lies along the border of Virginia and North Carolina, including the counties of Person and Granville in the latter state. The length of this belt is about twenty five miles, with a width of about three miles. The Virgilina district is in the sub-Piedmont division of the Appalachian belt, and contains a number of small mines of some promise.

In the same division of the Appalachian belt, but some distance to

the south, is found the Gold Hill district of Rowan county. This field was worked originally for gold, yielding about $3,500,000 from 1842 to 1893, inclusive, but the mines eventually were closed down, because of change of values at depth from gold to copper. The district is about one mile wide and twenty miles long, lying on a plateau of the Piedmont Mountains. The predominant copper ore is chalcopyrite, with gangue of quarts and decomposed schist. The outcrops of prominent ore bodies carry one to twenty per cent. copper, and some ores can be concentrated ten into one. The average sulphide ore of this district carries 2 to 4 oz. silver and 50 cents to $2 gold per short ton. The ore occurs in fissure veins, the secondary zone carrying considerable native copper and rich oxides and carbonates. The deepest workings are nearly 1,000 feet.

In Webster county, in the Cullowhee district, there is one producer and several developing properties of promise. This field shows lenticular bodies of chalcopyrite with quartz and corundum gangue, and prominent gossan cappings in a fracture plane following a basic band in schist.

NORTH DAKOTA. Copper was reported December, 1906, as occurring in this state, but a satisfactory verification of the statement has not been secured.

OHIO. Small masses of native copper, brought from Lake Superior by glacial action, are found occasionally in drift in this state, and native copper ingots and ornaments are taken from mounds built by a prehistoric race, but, so far as known, no copper has been found in place.

OKLAHOMA. Copper ore has been found in small quantities at several points in the state of Oklahoma, notably in the mountains of Woods and Woodward counties, where auriferous copper ores have been found, but no mines have been developed.

OREGON. Copper ores are found in this state in the counties of Baker, Douglas, Grant, Jackson, Josephine, Lynn, Marion, Umatilla, Union and Wallowa. Oregon enjoyed a small share of the California copper boom of 1860-1868, when there was considerable activity in southwestern Oregon, notably in Josephine county, where a smelter, one of the earliest on the Pacific coast, was built for treating oxidized copper ores. Josephine county carries the northern extension of the Coast Range copper belt found in Siskiyou and Del Norte counties of California. This belt, about 25 miles wide and approximately 50 miles long, shows large copper veins, usually carrying fair gold values near surface. The ore is mainly chalcopyrite, with occasional bornite, disseminated in pyrite and pyrrhotite. The district has one small but modern smelter, which can work only four to five months yearly, because of the heavy snows and rains that render the mountain roads impassable except in the summer.

Baker county, in eastern Oregon, has a number of developing copper properties of considerable promise. This county carries the western extension of the Seven Devils district of Idaho, along the Snake River. The copper deposits occur mainly in basaltic flows, interbedded with sedimentary rocks of Triassic age, showing fine grains of chalcocite and bornite, with occasional chalcopyrite, in lavas and tuffs, the mineralization apparently following the jointing planes.

The copper production of Oregon is small, but promises to increase.

PENNSYLVANIA. This state has copper ores, and in several cases old copper mines, in the counties of Adams, Berks, Bucks, Chester, Co-

lumbia, Lancaster, Lebanon, Montgomery and Philadelphia. The first copper producer of Pennsylvania was the Gap mine in Lancaster county, which was opened as a copper mine, late in the Eighteenth Century, and as such was a failure, but was reopened as a nickel mine, circa 1850, and was a successful producer of that metal, with a small incidental output of copper, until 1893, when it was closed by the competition of the richer nickel-copper mines of the Sudbury district of Ontario. The old mines at Cornwall, in Lebanon county, show native copper, cuprite, azurite, malachite, chalcopyrite, chrysocolla and brochantite. In Montgomery county the Perkiomen mine shows fully as long a list of copper minerals. Near Gettysburg, in Adams county, native copper and cuprite are noted, and native copper, cuprite, melaconite, malachite, chalcopyrite, aurichalcite and chryscolla occur in Jones's mine, near Morgantown, and elsewhere in Bucks county. Oxide, carbonate, sulphide and silicate ores of copper have been found in the Frankford stone quarries, in the city of Philadelphia.

RHODE ISLAND. There are no mines of copper in this state, but chalcopyrite occurs near Portsmouth, Newport county, and occurrences of azurite, malachite, bornite and chalcopyrite are reported from other points, though apparently found nowhere in commercial quantities.

SOUTH CAROLINA. Chalcopyrite is noted sparingly at the Fair Forest gold mines of Union county, but no copper deposits of promise have been found in the state.

SOUTH DAKOTA. Copper ores are noted in the counties of Custer, Lawrence and Pennington, all in the Black Hills, and a little copper mining has been done in these counties. Copper ores are used to a limited extent for fluxing refractory gold ores at some of the local smelters. Geologically, the copper measures of the Black Hills are comparable with those of the Ducktown district of Tennessee.

TENNESSEE. This state has important active copper mines in Polk county, small and idle mines in Sullivan county, and occurrences of copper ore are reported from Lawrence county and from Jellico Plains, Monroe county.

The discovery of copper in the Ducktown district of Polk county was made in 1843, by a gold hunter, who mistook crystals of cuprite for gold. As early as 1854 there were two small matting furnaces in commission, and 14 mines were worked, most of the ore being hauled by wagon 40 miles to a railroad, and shipped to Swansea for reduction. The district prospered until 1863, when work was suspended, owing to the American Civil War, and the mine remained idle until 1866, when work was resumed and continued until 1878, after which the entire district remained idle until 1891, when a British company begun work on a modern scale, and has scored a marked success. The Ducktown district lies in the extreme southeastern corner of Tennessee and extends into the adjoining states of Georgia and Alabama. The Ducktown basin is an eroded plateau, enclosed on three sides by mountains rising 500 to 2,500 feet above the general level of the country, the basin having an average elevation of about 1,500 feet above sea-level. The country rock of the Ducktown plateau consists of foliated mica-schist, with intercalary gneiss, and the ore occurs in a fault-zone in rocks of lower Cambrian age. The mines

show a heavy gossan of fair grade hematite, which is shipped extensively to iron furnaces. The oxidized zone is comparatively shallow, and has been worked out in the active mines, leaving only chalcopyrite, associated with pyrrhotite in a gangue of quartz, epidote and other metamorphic minerals. The sulphide ores average about 2 per cent. in copper tenor, and are neither auriferous nor argentiferous, occurring as great lenses in metamorphic schist, sometimes with sharply defined walls and again grading into the country rock.

TEXAS. Copper ores in this state are noted in the counties of Anderson, Archer, Baylor, Burnet, Clay, El Paso, Hardeman, Haskell, Knox, Lincoln, Llano, Mason, Montague, Presidio, Stonewall, Taylor, Wichita, Wilbarger and Wise. A little native copper is found in Burnet and Llano counties, with chalcopyrite in both counties and argentiferous tetrahedrite in the latter. Along the Brazos river there are Permian red beds showing carbonate and silicate ores in sandstone. There have been occasional sporadic attempts at development of copper mines, but as yet nothing serious has been accomplished, the ores as a rule being low grade carbonates, sulphides and silicates, distributed in beds of Permian age.

UTAH. This state, while now ranking fourth in point of production among American commonwealths, is scarcely second to any in promise, and possesses in one of its camps the largest bodies of ore of any metal known anywhere upon the globe. The copper production is increasing rapidly, and, in 1906, the copper output of Utah was about as great as the production of either Michigan or Montana in 1887, and about as large as the output of Arizona in 1897. The state has copper mines, or attempts at mines, in the counties of Beaver, Box Elder, Davis, Emery, Grand, Iron, Juab, Morgan, Piute, San Juan, Salt Lake, Summit, Tooele, Uintah, Utah, Wasatch, Washington and Weber.

In Box Elder county, near the Nevada line, there are promising copper deposits in limestone, showing good gossans above, and, as a rule, having heavy fluccans along either or both walls.

The first mining in Utah was done in Beaver county, just before 1860. The principal copper developments in this county are in the Cactus district, and at Milford. The richness of the Beaver county ores has been exaggerated, for stock-selling purposes, but one of the mines, under careful management, has reached the point of paying dividends, and it is probable that Beaver county will be given more serious attempts at mining in the future.

Juab county, in the centeral western portion of the state, has a number of old and large producers of silver and lead, and with increasing depth there is an increase in copper values, with considerable gold. The Tintic district, of which Eureka is the principal town, shows Carboniferous limestones, with intrusive quartzite on the west and rhyolite on the east, with ore occurring as contact deposits in both the sedimentary and igneous rocks, the ores being almost exclusively sulphide and carrying good values in lead, zinc, copper, silver and gold.

Piute county has been almost exclusively a gold and silver mining field, but shows considerable copper.

In San Juan county there is a copper field showing sedimentary rocks of Carboniferous age, these including limestone, shale and quartzite,

The Virgilina district lies in Halifax county, Virginia and in Granville and Person counties, North Carolina. The field is about three miles in width by twenty-five miles in length, and in Virginia runs from the state line to the Hyco River, about 8 miles north. The ore is mainly chalcocite, with occasional bornite, having a gangue of quartz and talcose altered country rock, the ore averaging about 3 per cent. copper, but with chutes of high grade ore running 5 to 25 per cent. in tenor. Selected ores, as shipped average 6 to 10 oz. silver and 75 cents gold per ton. The ores which are highly silicious and require concentration, occur in lenticular chutes of varying sizes, from 6 inches to 20 feet in width, and with an extreme length of several hundred feet, lying in fissure veins cutting schistose rocks altered from andesite and similar volcanic rocks. The average copper tenor of the ores of the district is said to be about 2 per cent.

The Blue Ridge district runs along the mountains in the counties of Warren, Fauquier, Rappahannock, Madison, Page and Greene. This district shows pre-Cambrian basaltic flows, capped by sedimentary beds and intruded by granitic rocks, later faulted and subjected to regional metamorphism. The gossans are not prominent and the copper occurs mainly native and as cuprite, with small quantities of carbonates and occasional bornite and chalcopyrite. This district shows mainly gash-veins, with promising surface ores which do not hold to depth.

The Gossan Lead of Grayson, Floyd and Carroll counties, in southwestern Virginia, shortly above the North Carolina line, is traceable for upwards of ten miles in a fault fracture between schists and slates of Cambrian age and metamorphosed schistose diorite. This district has been worked extensively for iron ore, from its limonite gossans, and produced a little copper in the decade previous to the American Civil War, from chalcocite disseminated in pyrrhotite, but the average copper contents are estimated as slightly under one per cent.

The fourth district includes Loudoun and Culpepper counties, where copper ores are noted at various points, and where there have been some desultory attempts at mining at various times.

WASHINGTON. This state has a number of copper deposits of considerable promise, and bids fair to become an important producer eventually. Copper ores are noted, and there are mines, or attempts at mines, in the counties of Chelan, Clarke, Cowlitz, Ferry, King, Kittitas, Lewis, Lincoln, Okanogan, Pierce, Skagit, Skamania, Snohomish, Stevens and Whatcom.

In Chelan county there are large bodies of ore of low average grade, and the district is regarded as promising.

In Ferry county there are copper ores in the vicinity of Republic, and most of the mines in that camp carry cupriferous values to a greater or less extent.

In King county the Skykomish or Foss River district shows promising occurrences of ore, mainly chalcopyrite, with good outcrops.

In Kittitas county the Cle Elum district shows a cupriferous belt, nearly a mile in width by several miles in length, carrying copper ores of good average tenor that show strong outcrops.

Okanogan county, near the British Columbia boundary line, shows

numerous bodies of copper ore, mainly of low grade, but of considerable size, and the field is one that may develop important low grade mines in time.

In Pierce county native copper occurs near Eatonville, and various copper ores are found elsewhere in the county.

The Mount St. Helens district lies mainly in Skamania county, with portions in Cowlitz and Lewis counties. There are several promising mines under development in this field.

In Snohomish county the Darrington district, in the Cascade Mountains, has a number of developing mines, opened on a wide ore zone carrying paystreaks of massive bornite and chalcopyrite The Index district of Snohomish county shows a number of properties, on which more or less work has been done, but has suffered severely from wildcat promotions. The veins generally are narrow, and values irregular, occurring in concretions and kidneys of bornite, with small granules of bornite disseminated in a granitic gangue. For concentration the ore must be crushed to about sixty mesh, and slimes so badly that on an average less than half the copper values have been recovered.

In Stevens county the Chewelah district shows chalcopyrite, both massive and disseminated in pyrrhotite, in schist, near a granite contact. This district has been a small producer of copper for many years.

WISCONSIN. Copper ores are noted in this state in the counties of Ashland, Burnett, Chippewa, Crawford, Douglas, Grant, Iowa, Lafayette, Polk and Sauk.

The northern fold of the Keweenawan trap formation extends across the Lake Superior shore of northern Wisconsin, from Hurley to the Minnesota line, carrying more or less native copper in the amygdaloidal portions of various trap beds. The Keweenawan series is fully described in the article on Michigan. Some remains of prehistoric mining have been discovered east of the Fond du Lac mine, near the Brule river, and in the vicinity of the Percival mine, in Douglas county. The first attempt at copper mining, in historical times, was made in Douglas county, in 1845, by the North American Fur Company, which opened a shaft on a lean vein of tetrahedrite. Further mining attempts in this district were made in 1855, 1862, 1873 and 1898. Work was resumed in 1907 on a property on the Minong range, which is on the southern fold of the Keweenawan syncline, in the southern part of Douglas county.

In Crawford county an attempt was made at copper mining just previous to 1860, in the vicinity of Prairie du Chien. Copper ores are noted in the lead and zinc districts of southwestern Wisconsin at Shullsburg, Lafayette county, and at Mineral Point, Iowa county, where some crude attempts at copper mining have been made. Chalcopyrite and malachite have been found in Sauk county, and auriferous and argentiferous copper ore was found in 1902 in a diamond drill hole bored north of Osceola, Polk county. Copper ores are found south of Boscobel, Grant county, and chalcopyrite of good grade occurs near Mellen, Ashland county, where some attempts have been made at mining.

WYOMING. This state has copper mines or attempts at mines in the counties of Albany, Big Horn, Carbon, Converse, Frémont, Laramie, Natrona, Sheridan and Weston. The state has copper fields of consider-

able promise, but production has been small, owing to lack of transportation facilities in the principal districts.

The Grand Encampment copper district is of immense size, having an estimated area of 2,500 miles, lying in the southern half of Carbon county and the southwestern quarter of Albany county, and being divided into nearly equal parts by the North Platte river. The Sierra Madre Mountains lie to the west and the Medicine Bow range to the east. Gold prospecting was begun in 1898, but was not especially successful, and was followed a year or so later by copper prospecting. The district has been a producer since 1900, hand-selected ores shipped for treatment ranging 30 to 49 per cent. in copper tenor in carload lots, the higher grade ores carrying $8 to $10 gold and silver per ton. The general formation of the Sierra Madre Mountains is an irregular core of red granite, with superimposed Algonkian mica-hornblende schists. Associated with the schist, and conformable in strike and dip, are huge ledges of limestone and altered schist, known locally as lime dykes, being composed mainly of limestone and silica. There are extensive evidences of alteration and replacement in the granite, diorite and schists. The principal ore bodies occur on the contacts between the schists and adjacent rocks, notably quartzite. The gossans usually are of soft spongy limonite, with some hematite and a little quartz. The veins range from mere stringers to 20 feet in width, and the zone of oxidation, as determined, is from 35 to 100 feet in depth, being succeeded by bornite and massive chalcopyrite, the oxidized zone showing mainly azurite and malachite, with a little native copper. The Medicine Bow range shows a core of gray and red granite, flanked irregularly by schist and gneiss, with dykes similar to those of the Sierra Madres. The Rambler mine, in the Medicine Bows, was opened in 1900, for gold, abandoned as worthless, and relocated for copper. This mine is notable for its large quantities of covellite, and for carrying platinum, palladium, osmium and iridium, this being the first known occurrence of platinum in connection with copper.

In Albany county, in addition to a portion of the Grand Encampment district, there are copper mines in the Spring Hill and War Bonnet divisons of the North Laramie Peak district.

The Laramie Hills district runs along the southern boundary of the state, from Laramie through Albany and Converse counties, to Casper, Natrona county. This range shows a granite core, with generally north and south trend, flanked by schists and various sedimentary beds. Copper occurs native, in red altered granite, at Sherman Hill, and as sulphide ores at Hecla, Slate Creek, Cooney Hill and to the northward of Laramie Peak. Laramie county includes the Hartville uplift, in east central Wyoming, showing a considerable geological resemblance to the Black Hills of South Dakota. Copper ores are found throughout the entire uplift in fissure veins and lenses, usually pinching out at slight depth, and also as blanket veins. Some copper mining was done in this vicinity as early as 1881, when 75 men were employed at the Sunrise mine, but the industry was not successful, owing to lack of rail transportation.

CHAPTER XV.

Copper Deposits of Canada and Newfoundland.

In this chapter the copper deposits of Canada are treated in detail by provinces and territories, and, for geological convenience, Newfoundland is added, although Newfoundland is not a part of the Dominion of Canada, being the oldest colony of the British crown. Because there seems no other place for it, the few lines referring to the discovery of copper in Greenland are added to this chapter, though Greenland is an appanage of the Danish crown.

Although copper has been mined for many years in the eastern provinces of the Dominion of Canada, and the mines of Georgian Bay, in Western Ontario, are of practically the same age as the oldest of the Lake Superior properties in Michigan, the Canadian copper industry did not come to importance until the exploitation of the great nickel-copper deposits of the Sudbury district, beginning with about 1886. Ten years later the production of the Trail district in British Columbia became important, and was followed by far greater developments in the Boundary district of the same province, this field now ranking among the really important copper districts of the world. Despite its considerable present development, the copper industry of Canada must be rated as merely in its infancy, and the dominion must be included in any list of the principal copper producing countries of the present or future.

British Columbia produces more than three-fourths of the Canadian copper output, and Ontario furnishes nearly all the balance of the production, but there are small mines in most of the other provinces, and the territory of Yukon is a potential producer of importance.

BRITISH COLUMBIA. This Canadian province is a kingdom in both area and resources and its developed wealth in timber, minerals, arable lands and fisheries is trivial, compared with its possibilities. The first mining was for gold, in placer washings, shortly after the middle of the Nineteenth Century, after which the mining industry languished, until the completion of the Canadian Pacific railroad, when quartz mining was begun, in a small way, first for gold and silver, and later for lead. It was found, about 1896, that the mines of the Trail district carried considerable copper values, and the copper industry of the province dates from that discovery. In the last years of the century the first copper mines were opened in the Boundary district, and these have become of great importance. Most of the gold and silver mines of British Columbia carry more or less lead and copper, highly useful as fluxing agents, while the copper ores almost invariably have appreciable values in gold and silver, this comity of the metals aiding greatly in the development of the various mining fields of the province, most of which are low in grade, though with large ore bodies.

In 1906 the Boundary district made 75 per cent. of the total copper production of British Columbia, followed with 12.5 per cent. from the

mines of the Pacific coast, and 11.5 per cent. from the Rossland mines of the Trail district. Nearly all of the other mining districts of British Columbia have copper ores, with small mines, or attempts at mines, but, in 1906, the production of all the other districts combined was 1.25 per cent. of the total output of the province. With better transportation facilities, some of the other districts, now negligible as producers of copper, should become of importance.

The copper smelting industry of the province is well developed, and British Columbia has some of the largest, most modern and best managed copper smelters now in existence, and the Granby mine, of the Boundary district, holds the world's record for low smelting costs.

The Boundary district, lying along the northern border of the state of Washington, includes the Kettle River, Grand Forks and Osoyoos mining divisions, which are contiguous. The mountains are not especially rugged, and as a rule the western and southern slopes are open. The formation includes somewhat altered sedimentary rocks, mainly limestones, with granite, greenstone and other eruptives, the ores of the district occurring mainly in altered limestone near the contacts with igneous intrusives. The ore bodies are almost exclusively disseminated sulphides, very low in grade, but of immense size, slightly auriferous and argentiferous, and self-fluxing, requiring only small charges of coke for reduction. The Boundary district is an important copper field, and must continue to increase in production for many years to come. This district is comparable with the Lake Superior copper field, not only in the low grade of its average ores, but also in the enormous size and certainty of its ore deposits, and the magnitude of the investments and equipments required for profitable copper production. These heavy investments afford assurance of permanent operation, and heavy production, regardless of fluctuations in the price of the metal.

The copper deposits of the Pacific coast include numerous mines on the various islands scattered from Puget Sound to the Alaskan boundary, and also on the mainland. Most of these mines are on Vancouver Island, where copper ores are found along the western side. Ore occurs mainly as replacements in marble and greenstone, along and near the contacts with dykes of igneous rock. The ore bodies are very irregular, and carry magnetite and garnet gangue, with segregations of chalcopyrite and local enrichments of bornite. On Texada Island the nature and occurrence of ore bodies are practically similar to those on Vancouver Island, and, in the main, the coast deposits are of this same class.

The Trail district, of which Rossland is the center, shows an area of eruptive rocks, mainly diorite, cut by many porphyritic dykes of one to eighty feet width, having a mainly north and south strike. Veins are shear-zone fissures, ores consisting of country rock more or less replaced by or impregnated with cupriferous pyrrhotite, the metallic values being mainly in gold but including considerable copper, and a small amount of silver.

The Yale district includes the Similkameen division, with exposures of copper ore, mainly refractory, at many points. Development is slight but the district is of considerable promise. The Aspen Grove field of the Similkameen division shows eruptive rocks in parallel flows, ore occurring

y in a red breccia that carries
. There also are promising
Keremos section of the Similkameen
ity of Olalla and Princeton.

FRANKLIN. Indications of copper
g the eastern side of Baffins Land

KEEWATIN. In the southern
iny River, native copper is shown
ons of copper on the western
r, flowing into a bay of the Arctic
e real or fancied exposure of the
, and but little known, though it
ious points.

LABRADOR. There are fairly
bougamou district, and also on the
he peculiar situation of being a
it, the management of its affairs
vince of Quebec, which looks after
wn colony of Newfoundland which
eastern shore that is known as

MACKENZIE. An immense
orted to exist near the mouth of the
an, some distance north of the
ne and size of this deposit have
nes from whalers, devoid of
erience.

MANITOBA. Along the eastern
the Woods, is a small area of
hes width, reported to occur be
a half mile, showing a cupri
pyrrhotite, has been prospected
tario border.

NEW BRUNSWICK. Copper
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found in red sandstones of
arly to conglomerates, and
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ade at mining both ores and

NOVA SCOTIA. This
ape Breton, Cumberland,
the counties of Annapolis
on to these counties, copper
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ment in order, in two miles on the principal western belt stone, near mainly chalof this dis- 12 inches to incipal mines contacts with

gangue, and occurring in veins traversing diorite and felsite. The more important mining developments are in Cumberland, Inverness and Cape Breton counties, the Coxheath mines of the latter county having been the principal producers in the past.

ONTARIO. Copper was discovered on the northern shore of Lake Huron as early as 1770, but the first real mining was begun at the Bruce Mines, on the northern shore of Georgian Bay, in 1846, immediately after the opening of the first Lake Superior native copper mines in Michigan. Copper is found native at numerous points, and in the Sudbury district occurs as nickel-copper sulphides, but the deposits mainly are iron-copper sulphides. As a rule, the oxide and carbonate ores of the alteration zone are missing in Ontario, the iron sulphides, mainly chalcopyrite, reaching to surface with slight traces of change, though small quantities of bornite are noted at times.

Ontario is a large province, and shows a great diversity of geological and topographical conditions, its frontier marching with New York in the east and Minnesota on the west. The province has copper mines in the counties of Frontenac and Hastings and in the districts of Muskoka or Parry Sound, Nipissing, Algoma, Thunder Bay and Rainy River, and, in addition, has copper ore in Lancaster and Lanark counties, and elsewhere.

The Muskoka district lies along Parry Sound, on the eastern shore of Georgian Bay. The surface of the country is glaciated, showing mainly rock exposures. The prevailing rock-forms of the district are gneisses and schists, the formation showing much flexure and faulting, with numerous small quartz veins and frequent pegmatite dykes of large size and great persistence. The topography is rough, and much of the rock is utterly devoid of vegetation or covering of any sort, the bald knobs alternating with marshes and swales in the lower ground. The mineralized zone is apparently about a quarter of a mile in width, with a generally northeast and southwest strike, and has been prospected for about twelve miles in length. Ores occur as extended and approximately parallel series of lenses, with a general trend in line with the mineral belt, practically along the fault zone, lenses varying from 5 to 40 feet in width, as a rule, though occasionally showing much greater width, and usually carrying a limonite gossan. The ore is mainly chalcopyrite disseminated in pyrite, showing occasional chalcocite and bornite, and carrying $3 to $10 gold per ton. Sphalerite is associated with copper, as a rule, and some of the beds are nickeliferous, ranging as high as 2.5 per cent in nickel tenor.

The Sudbury district, discovered 1882, where mining was begun in 1886, is an oval of about 40 miles length by 20 miles width and is considered locally as two ranges, each crescents with ends joined. The principal developments are on the south or old range, running from Sudbury to Carson. The interior of this oval shows a trough of rocks of Cambrian and Silurian ages, consisting of slates, sandstones and volcanic tuffs, flanked on the outside by granite. The ores occur as irregular chutes, in mammoth lenses varying greatly in metallic values, but with an average of 2.5 per cent. to 5 per cent. nickel, and carrying, as a rule, about one-half as much copper as nickel.

Copper developments in the Nipissing district have been overshadowed

by the sensational discoveries of native silver in the Cobalt field, but there are bodies of copper ore in this district that seem worthy of exploitation.

The district of Algoma is very extensive, and shows copper at many points. Principal development in the past has been in the Bruce Mines district, on the northern shore of Georgian Bay, where the ore is chalcopyrite, with quartz gangue, in strong fissure veins. Between Sault Ste. Marie and Sudbury there are several developing mines of considerable promise, in the Massey Station district, and good sulphide ores have been found in the Goulas Bay region, circa 30 miles north of Sault Ste. Marie. The Keweenawan formation of Michigan is found on Michipicoten Island, and also on the mainland east of the island, at Mamainse Point, about 50 miles north of the Soo, but exploratory work has not as yet shown workable values in the native copper deposits. Michipicoten Island also carries various sulphide and arsenide ores of copper.

In the Thunder Bay district, on the northern shore of Lake Superior, native copper has been found on Battle Island, east of Thunder Bay, on St. Ignace Island, in Nepigon Bay, at Black Bay, on Shebandowan Lake, at Pointe-aux-Mines, and elsewhere. Chalcocite is noted on Spar Island, and chalcocite and malachite are found on Silver Islet, this tiny island having been the location of the first great native silver mine of the world, which was fully as rich as any of the present-day bonanzas of Cobalt. Chalcopyrite also occurs at Neebing and elsewhere.

In the Rainy River district sulphide ores of copper have been found at various points, but the mining in that district has been mainly for gold, in the numerous fissure veins with quartz gangue that traverse granite, and which have an unfortunate habit of going wrong at a depth of 400 to 500 feet.

There are strong evidences of copper in the wild and little known district between Sault Ste. Marie and James Bay, and with the completion of a projected railroad, certain to come sooner or later, this district may prove an important producer of both copper and iron, and very likely of silver as well.

QUEBEC. Copper ores have been found in the counties of Arthabaska, Bagot, Beauce, Browne, Dorchester, Drummond, Levis, Lotbiniere, Megantic, Missisquoi, Richmond, Shefford, Sherbrooke and Wolfe, also on the northern shore of the Gulf of St. Lawrence in the district of Saguenay, and promising specimens of ore have been secured from the Lake St. John district, near Labrador.

The principal copper deposits of Quebec, judged from development in the past, lie in three zones, shortly north of the Vermont border, in Sherbrooke and adjoining counties. These belts average about two miles width, and are about 25 miles apart. The eastern belt has been the principal producer, from mines in the vicinity of Capelton. The western belt is about 60 miles east of Montreal, showing ore bodies in limestone, near igneous intrusives. The ores of the Capelton district are mainly chalcopyrite, or cupriferous pyrite and pyrrhotite. The pyrite of this district occurs in lenses, following cleavage planes, varying from 12 inches to 30 feet in thickness, and up to 100 feet in length. The principal mines have been opened in limestone associated with slate, in contacts with

diorite and serpentine. The cupriferous pyrites are of good sulphur tenor, and while the Capelton mines carry only 2 to 4 per cent. copper, and 3 to 4 ounces silver per ton, the sulphur values render these low-grade ores profitable, when worked with skill and prudence.

YUKON. The principal copper deposit, and the only developed copper mines of Yukon, are found in the vicinity of White Horse, near the Alaskan border. The White Horse district, at the head of navigation on the Lewes River, is connected with Skagway, Alaska, by the White Pass & Yukon railroad, 110 miles in length, which has such tremendous grades that five 110-ton locomotives are required to take a train over the summit. Copper was discovered in this district in 1898, and a number of small but rich mines have been developed, these being much hampered in production by exceedingly high freight rates, and lack of local smelters or local fuel available for smelting purposes.

The White Horse copper belt is 15 to 20 miles in length, with a generally north and south trend, west of and nearly parallel with the Lewes River, with a width, as developed, of one-half mile to nearly 3 miles. The belt shows copper deposits along the contact of limestone and granite, the contact deposits connecting with fissure veins traversing granite. The developed mines are 4 to 10 miles southwest of White Horse, and the district has been prospected for about 20 miles, with assessment work done on about 200 claims. The zone of secondary enrichment shows occasional carbonates, but principal ores are sulphide, formerly reported as mainly chalcopyrite with occasional chalcocite and bornite, but the ores now developed are mainly bornite. It is probable, however, that pyritic ores will succeed at slightly greater depth. The enriched sulphides carry fair values in both gold and silver, and the ores shipped have been of very high tenor. Exploratory work is hampered by a glacial moraine, which leaves only occasional exposures of ledge-rock. This district is of some present importance, and of much greater promise for the future.

NEWFOUNDLAND. The first copper mines of importance were opened in the Tilt Cove district in 1862, and remain considerable producers. There are deposits of chalcopyrite and cupriferous pyrite at many different points on the island, with occurrences of native copper in Placentia Bay, and elsewhere. The developed mines carry cupriferous iron pyrites, in which the sulphur values are an important factor. The island produced about 1,500,000 tons of cupriferous pyrites to the end of the Nineteenth Century, and apparently has far greater available resources for the future.

The Newfoundland deposits occur mainly in serpentine rocks and chloritic slates lying parallel to the serpentine in rocks of lower Silurian age. The principal cupriferous districts are on Notre Dame Bay, in the northeastern portion of the island, this including the Tilt Cove and Betts Cove fields, at Bay of Islands, in the western portion, and at Lady Pond and Birchy Cove. On Oderin Island, in Placentia Bay, in the southeastern portion of the island, native copper occurs in stratified archaic rocks, and one mass of copper weighing 55 pounds has been taken from a melephyr, in strata of a geological horizon corresponding to that of the Keweenawan formation of Lake Superior.

The Tilt Cove district, on Notre Dame Bay, in the northeastern portion of the island, has been traced for about 40 miles, and the Tilt Cove mines are the only steady copper producers on the island. The district shows 4 main series of lenses, carrying pyrite in which is disseminated chalcopyrite having an average tenor of about 4 per cent. copper, 50 per cent. sulphur and $1.50 gold per long ton. The ore is bunchy in occurrence, the ore beds ranging from 4 to 10 feet in average thickness, but being much broken and disturbed, while the veins frequently become barren, and sphalerite is found in frequent connection with chalcopyrite.

GREENLAND. An exploratory expedition, sent to Greenland in 1906, by N. Bernberg, a public-spirited merchant of Copenhagen, reports the discovery of large deposits of copper ore at Alanjarssnak, on the western coast of the island.

CHAPTER XVI.

Copper Deposits of Mexico.

The Republic of Mexico has made relatively greater progress in copper production, since the beginning of the Twentieth Century, than any other country, and in actual increase of output stands second only to the United States. There is every reason to predict a large and fairly steady growth in Mexican copper ouput, as all of the essentials of a large and profitable production are found in more than one state of the Republic, such essentials being enormous deposits of ore of medium to high grade, transportation facilities, that in many cases are excellent, and which are being improved by extensive railroad construction, and settled political conditions. Occasionally complaints are made by foreigners, operating mines in Mexico, of unjust treatment by the authorities, but, as a rule, these complaints fall into two classes, the first being due to neglect to comply with the just but stringent Mexican laws regarding titles and methods of keeping accounts, while the second, having a foundation of fact, relates to the petty exactions of petty officials. In cases where the operators of mines have experienced arbitrary or unjust treatment from local officials, complaints to the governors of the states, or to the president of the Republic, have resulted, almost invariably, in the speedy correction of any injustice.

Previous to the Spanish conquest the Anahuac races had acquired considerable mining experience and metallurgical skill. The work of extracting metallic values done by the aborigines of Mexico deserves to be called real mining, as the antiguas of date previous to the conquest show shafts and tunnels of considerable extent. The metals found by Cortez in more or less general use, and for sale in the great market place of Tenochtitlân, included gold, silver, copper, tin and lead. Copper was employed freely in the mechanical arts, the metal being used mainly in the form of bronze, through alloying copper with tin, and was hardened by hammering. The best tools of the natives, made previous to the Spanish conquest, assay about 94 per cent. copper and 6 per cent. tin. Not only did the Aztecs utilize the metals for industrial purposes, but they had, apparently independent of old-world influences, developed a system of metallic currency, with gold in quills and copper coins in the shape of the Gothic letter T.

In 1895 the Mexican copper output was only 11,620 long tons, and ten years later exceeded 55,000 long tons, a growth of practically five hundred per centum in a single decade, being much the largest proportional increase made by any country, and the largest actual increase made by any nation except the United States. At the end of July, 1906, there were mines as follows in Mexico: copper, 956; iron and copper, 209; copper and lead, 25; silver and copper, 773; silver, copper and lead, 310; gold, silver and copper, 1,314, a total of 3,587 copper mines and mines with cupriferous values, as compared with 2,931 different cupriferous mines in the preceding year. In July, 1907, there were upwards of 1,000 copper mines alone,

and nearly or quite 4,000 mines in which copper values were of appreciable importance. These figures are not for single pertenencias, as is the case in Chile, but are for individual properties, ranging in size from a single hectare to thousands of hectares in the case of the Greene-Cananea and other large mines.

The smelting industry of Mexico is highly developed and is increasing rapidly in importance. The production of copper in a given field depends not only upon the richness and extent of its ores, and the experience and energy of its miners, but also is dependent to a very large extent upon the items of transportation and smelting. The transportation facilities of Mexico are excellent, for so rugged a country, and are being improved steadily, by the construction of new railroads of prime importance. The republic now possesses some of the largest and most modern smelters of copper and lead to be found anywhere upon the globe, and further enterprises of great importance are projected. It is doubtful if any country of equal extent anywhere upon the earth's surface possesses mineral values equal to those of Mexico.

Mexico has copper mines in the states of Aguascalientes, Chihuahua, Coahuila, Durango, Guanajuato, Guerrero, Hidalgo, Jalisco, Mexico, Michoacán, Neuvo León, Oaxaca, Puebla, Queretaro, San Luis Potosí, Sinaloa, Sonora, Tabasco, Tamaulipas, Zacatecas, and in the territories of Baja California and Tepic. In point of production of copper, Sonora easily leads, with Lower California second, but there are copper developments of prime importance in a number of other states, notably in Chihuahua, Coahuila, Guerrero, Jalisco, Michoacán and Puebla.

Copper in almost every known form is found in some part of the republic, the cupriferous measures being very extensive and including a great variety of types. Argentiferous copper ores are found frequently near the crystalline slates of the Azoic group, a typical example occurring in the district south of Puebla. Copper accompanied by hematite is noted in cretaceous beds of Mesozoic age, while in the Cenozoic group copper is found in regular veins in hornblendic andesite of the Pliocene system, also in the stratified sedimentary beds of the upper Miocene and lower Pliocene, as at the Boleo mine in Baja California. Copper deposits occur frequently in acid Tertiary rocks. The Sierra Madres are highly mineralized, not only as to the main range, but also, as a rule, in their foothills and outlying spurs. In northern Mexico there seems a preponderance of silver-lead deposits on the eastern slope, and of copper and gold values on the western slope of the cordillera. The principal mining portion of Mexico extends, unbroken, for a distance of fully 1,500 miles, with an average width of 250 miles, from the American border on the north into the state of Oaxaca in the south and the possibilities of Mexican mining developments in the future are past human computation.

AGUASCALIENTES. In July, 1907, this state had 49 registered copper mines, in addition to numerous other properties carrying copper as other than the principal metal. The principal copper developments are in the dioritic rocks of the Tepezalá district, where the ore is mainly chalcopyrite, with silicious gangue. The copper ores of the Pánuco district occur mainly in pegmatite dykes, as chalcopyrite.

BAJA CALIFORNIA. Though known to the early Spanish conquistadors, little mining was done in Lower California until the middle of the Nineteenth Century, and the first copper mining of real importance dates from the discovery of the Boleo mines, in 1868, and the beginning of their exploitation, in 1871. The Boleo mines occur in a district of approximately three miles width by seven miles length, on a plateau lying parallel with and near the coast. The development of this district has been in the hands of a single company, and it is probable that other deposits of value remain for later development. The Boleo mines are opened on beds occurring in a formation of Tertiary sandstones, conglomerates and tuffs. The cupriferous beds, three in number, of large area, lie upon conglomerates of varying horizons, and are overlaid by argillaceous tuffs, all traversed by fissures. In the upper bed, above the water level, the values are in disseminated oridized ores, such as cuprite, melaconite, azurite, malachite, atacamite, crednerite and chrysocolla, all in quantities of commercial importance. In the second ore bed there are peculiar globular concretions of oxide and carbonate ores, called boleos, whence the name of the mine. The third bed, in addition to the oxide, carbonate and silicate ores, carries the secondary sulphides chalcocite, covellite and bornite. The ores are disseminated in irregular masses, veinlets and concretions, in a clayey tuff, with a marked tendency toward concentration upon the underlying conglomerates, where the ores occur compact in layers of six to ten inches.

In July, 1907, Baja California had 65 registered copper mines, and in addition to the Boleo mines of Santa Rosalia, there are promising beds of copper in the municipalities of La Paz, Mulegé, Comondu, Todos Santos and San Antonio, and in Baja California Norte there are rich copper ores, apparently of considerable extent, near San Fernando and about 70 miles south of San Quintin, with promising ore bodies in the Santa Catarina division.

CHIAPAS. The only developed copper property of importance in this state is the Santa Fé mine, though extensive remains of prehistoric operations are shown, these including surprisingly long tunnels, showing that the ancient miners were both persistent and skillful.

The Santa Fé mine, near the Tabasco line, is a contact deposit of most unusual type, the ore outcropping in strata of wollastonite resting on slate, with underlying massive igneous rocks, as contact deposits in wollastonite and between wollastonite and the igneous intrusives. The ore body is of great size, carrying bornite, chalcopyrite, bournonite and tetrahedrite, with chimneys of oxidized ores, all of the ores being argentiferous and associated with free gold, the ore having a garnet gangue. The ore values average 3 to 4 per cent. copper, 6 to 8 ounces silver and $6 to $30 gold per ton.

There also are auriferous copper mines, slightly developed, in the Pichucalco district.

CHIHUAHUA. This state is mainly a producer of silver and lead, being one of the greatest lead mining fields of the globe. Copper frequently is found associated with silver-lead ores, and there are some deposits in which copper is the predominent factor of value. Copper production is

increasing steadily and gives promise of much future importance. Copper is produced on a commercial scale, not only at a number of distinctively copper mines, but also from cupriferous sulphide ores in silver-lead deposits. There are copper mines in the districts of Bravos, Guerrero, Jiménez, Ocampo, and Parral, and in addition to these, copper deposits are known in the districts of Arteaga, Galeana, Iturbide and Matamoros.

COAHUILA. In July, 1907, the state of Coahuila had five copper mines, and a considerable number of other mines carrying copper values. The most important cupriferous district, judged by present developments, lies near Jimulco, a short distance south of Torreón, in which copper ores of excellent average tenor occur in limestone strata in a district showing no igneous outcrops.

COLIMA. In July, 1907, the state of Colima had twelve registered copper mines, all with small development, and oxide and carbonate ores of high grade have been found at numerous points in this state.

DURANGO. There were fifty-one copper mines officially registered in Durango in July, 1907. The principal cupriferous developments are in the Velardeña district, where highly important mines have been developed in copper-lead ores. There are small copper mines in other fields, with numerous occurrences of copper ore throughout the state.

GUANAJUATO. The state of Guanajuato is one of the most famous mining districts of the world, and its silver mines are credited with a production of about $600,000,000, measured by gold values. The silver mining industry of Guanajuato is being rejuvenated by American enterprise and capital, and the future of the district is brighter than for many years. One of the old mines of the city shows considerable copper ore, apparently in workable quantities, but this never has been utilized, because silver was the metal desired. In July, 1907, the state had four registered copper mines.

GUERRERO. The state of Guerrero had 44 copper mines and a number of other mines carrying copper values, in July, 1907. These mines are located in the districts of Ajuchitlán, Aldama, Bravos, Minas, Tavares and Taxco.

The most important copper mines are La Dicha group, in the districts of Bravos and Tavares, south of the Balsas river, on the Pacific coast of the southern Sierra Madre range, and about forty miles from the port of Acapulco, where extensive developments are under way. The ore exposures of this group are more or less continuous for four to five miles, showing mainly chalcopyrite, associated with pyrrhotite, in micaceous metamorphic schist with quartzite bands, the deposits carrying a thin but rich bed of secondary sulphides immediately above the pyritic ores. The average values of the pyritic ores probably are 3 to 4 per cent. There are copper deposits of promise adjacent to La Dicha group, along the Balsas river.

In the Ajuchitlán district, fissure veins with quartz gangue, in granite, carry prominent gossans, showing considerable chrysocolla in the oxidized zone, in addition to the usual oxide and carbonate ores. Auriferous copper veins occur in aplite and Tertiary diorite, in the Minas district.

HIDALGO. There were five registered copper mines in the state o Hildago in July, 1907, the principal copper district being at Zimapán where considerable work is under way.

JALISCO. The state of Jalisco leads all the others of Mexico in th number of copper mines, official figures showing no less than 302 coppe properties in the state in July, 1907. Most of these mines, however, ar small, though there are many of considerable promise, and a good star has been made at mining and smelting under modern conditions. Jalisc was the seat of a primitive copper mining, smelting and manufacturin industry of considerable importance, under the Aztec races, previous to th Spanish conquest. The principal cupriferous fields of the state include th districts of Ameca, Autlán, Ayutla and Cacoma, in all of which activ copper developments are under way. Auriferous copper veins occur i Tertiary diorite in both the Ameca and Cacoma districts. The ores ar mainly oxides and carbonates, with a little chalcopyrite, all strongly argent iferous, and at Autlán in addition to large quantities of malachite, sul phide ores are much in evidence.

MEXICO. The state of México had three copper mines in July, 190 and shows native copper and tetrahedrite in beds on the border, near Teju pilco, Jalisco.

MICHOACÁN. According to official records there were 95 copper mine in the state of Michoacán in July, 1907. This state is mountainous, an with rather indifferent transportation facilities, these drawbacks retardin development. One present-day property, the Inguarán, was worked e tensively in the days of the aborigines, and other copper mines were wrough by the Aztecs.

There are deposits of copper ore of more or less importance in th districts of Angangueo, Ario, Churumuco, Huacana, Huetamo, Oroalo, Pat cuaro and Tacambaro, the principal copper mines as now exploited bein in the district of Augangueo and in the Inguarán division of the Tacamba district.

In the Inguarán field ore deposits are found in micaceous quartzo diorite country rock and granite in several stages of alteration, with capping of silicious limestone of 200 to 300 feet in thickness. The depo its show oxidized ores above, but the principal values are in disseminat chalcopyrite, with a little bornite, both carrying fair silver values and little gold, with a gangue of granite-porphyry, the ores being disseminat through the country rock.

The Churumuco district shows high grade ores in fissures in diorit porphyry. In the Oroalo district veins occur in feldspar-porphyry, simil to those of Real del Monte in the state of Hildago.

NUEVO LEÓN. According to the government records there we three copper mines in Nuevo León in July, 1907, but none of extensi development or of unusual promise. There are copper ores at a numb of points in the state.

OAXACA. According to government records, there were only fo copper mines in the state of Oaxaca in July, 1907, but there were man mines in which there were considerable copper values. There are copp mines in the Ocotlán and Ejutla districts, south of the city of Oaxac

and there are copper ores also in the district of [illegible] Juárez and elsewhere.

PUEBLA. There were five registered copper [illegible] July, 1907, including the Teziutlán mines, which [illegible] portant copper producers in southern Mexico. The [illegible] deposits as an intimate mixture of chalcopyrite, [illegible] highly metamorphosed calcareous Cambrian slates. [illegible] per in andesite are noted near Colucán, and [illegible] other points.

SAN LUIS POTOSÍ. There were fourteen registered [illegible] this state in July, 1907. In the Matehuala district, which [illegible] portant producer of metal, the copper ores are [illegible] garnetiferous gangue, occurring as contact deposits [illegible] porphyritic rocks. There are cupriferous deposits [illegible] tricts of Catorce and Salinas, and copper ores [illegible] number at other points.

SINALOA. There are copper ores in nearly [illegible] of Sinaloa and the number of registered copper [illegible] 25. The northern part of this state is a [illegible] teau, but owing to indifferent transportation [illegible] mines of copper have been developed, though [illegible] considerable promise. With the completion of [illegible] der way, traversing this state, copper mining [illegible] ant and profitable industry. In olden times [illegible] ore, mainly argentiferous, was smelted in [illegible] mines.

SONORA. The state of Sonora, one [illegible] Mexico, is of immense size, being nearly twice [illegible] York, or as large as Michigan and Indiana [illegible] richest mineral fields in the world. It is [illegible] producing state of Mexico, and one of the [illegible] globe, with unusually brilliant prospects [illegible] government records there were no less than [illegible] in July, 1907, in addition to mines [illegible] derable copper was produced in adjoining [illegible] Spanish domination, and under the [illegible] tion of the copper industry begun in the [illegible] Century. Humboldt predicted, nearly [illegible] mineral wealth of the world would [illegible] consisted of the present states of Sonora [illegible] Mexico, and the territory of Arizona [illegible] state [illegible] being borne out to the letter, as [illegible] area, upon the globe.

Sonora, lying on the western [illegible] Cruz, [illegible] in copper and gold than is Chi[illegible]cán, and [illegible] values are mainly in silver and [illegible] [illegible] ins are of the Carboniferous [illegible] not seem [illegible] ipment, which requires the [illegible] worked cop- [illegible] hampered by lack of railroad [illegible]

ing is now under way. The frequent outbreaks of the Yaqui Indians also have caused much trouble in several of the mining fields. There are copper mines in the districts of Alamos, Altar, Arizpe, Hermosillo, Magdalena, Moctezuma, Sahuaripa and Ures.

The Alamos district is essentially a silver field, but contains much copper, this metal being an important by-product from the Quintera silver mines. The Piedras Verdes copper deposit is one of considerable promise, and there is little doubt that copper mines of importance will be opened, in time, in this district.

The Altar district has mines of gold, silver and copper, but developments in the copper line have been on a rather limited scale in the past, though the district has properties of promise.

The Arizpe district is the scene of the most extensive copper mining development in Mexico, and is the site of one of the greatest copper industries of the globe, in the municipality of Ronquillo, generally known as the Cananea field. The Cananea mines were worked as early as the Eighteenth Century, by the Casa Gua, of Chihuahua, later by Don José Perez, and eventually, in the latter half of the Nineteenth Century, by Governor Pesqueira, passing, in 1899, to the predecessors of the the present owners. The Cananea Mountains are an isolated range of about 25 miles length, lying in the free zone of northern Mexico, only a few miles south of the Arizona border, the range being of the short, isolated, variety typical of the Sonoran plateau in both Sonora and Arizona, and to the southeast is the Sierra Manzanal, almost a continuation of the Sierre de Cananea. The Cananea range of mountains consists of shattered and altered Paleozoic limestones, with intrusive masses of diorite and rhyolite, flanked by bedded tuffs. The mountain range has a northwesterly and southeasterly strike, the highest point being Elenita Peak, 7,600 feet above sea-level, and there is a zone of fissuring along the axis of the belt, ore bodies occurring as concentrations and replacements in either limestone or porphyry, the former being of Paleozoic age and the porphyries being largely rhyolitic. The district gives every indication of great volcanic activity at some remote date, followed by heavy erosion. As a rule the gossans are not heavy, much of what appears to be gossan at a short distance proving, on closer inspection, merely stained and weathered conglomerate. There are numerous ore bodies occurring as contacts between limestone and the igneous eruptives, largely as patches surrounded by crystallized rocks. The ores are of a great variety, ranging from native copper, in masses up to a hundredweight or even greater, through the rich oxidized ores and secondary sulphides, down to disseminated chalcopyrite. The ore of the Capote zone is almost exclusively pyrite coated with very thin films of chalcocite, usually with a porphyritic silicious gangue. The Capote ore body occurs in shattered quartzite, the ore being soft and containing sericite, causing trouble in concentration. The mines show a considerable variety of forms of occurrence, including contact metamorphic deposits, impregnated sedimentary rocks and fissure veins.

The principal developments in the Cananea field are in the southeastern half of the range, which is separated into two nearly equal portions by Puertecitos Pass. There is reason to believe, however, that ore deposits of value exist in the northern half of the range, this opinion being based upon personal inspection.

In addition to the great copper mines developed and developing in the Cananea Mountains, there are other highly promising deposits of copper ore in various other fields of the Arizpe district, including prospects in the Sierra Manzanal, and remarkably rich surface ores in the Sierra Aml, or Ajo Mountains, to the eastward of La Cananea. In fact, nearly every municipality of the district of Arizpe shows more or less copper ore.

The Magdalena district is a gold field, primarily, but each of its six municipalities shows more or less copper, and many of these are not devoid of promise.

The district of Moctezuma ranks in importance second only to that of Arizpe, in the state of Sonora. There are large developed mines in the neighborhood of Nacozari, the hill on which the Moctezuma mine is opened being a body of cupriferous monzonite, too low in grade to work at present, but possibly available at some future time. Good mines of copper, carrying considerable values in silver and lead, are being developed in the vicinity of Cumpas, in the Moctezuma district and exploratory and development work on copper properties is noted at several other points.

The district of Sahuaripa, in the central eastern part of Sonora, has its eastern boundry on the line of the state of Chihuahua. The topography is exceedingly rugged, as a rule, but the district is better watered than some other portions of the state. Rail transportation is lacking, and the Yaqui Indians are very troublesome, at times, but the district is one of great promise for some future period when the Indian uprisings shall have been quieted finally, and cheap transportation is afforded by rail.

The Ures district contains a number of developing copper mines, in addition to mines of other metals, and while its production is small, at present, the time should come when rich and profitable copper mines will be steady producers of the metal.

TABASCO. The state of Tabasco has no copper mines, but is supposed to have copper ores near the Chiapas line, as the Santa Fé mine of Chiapas is but a very short distance from the state of Tabaseo.

TAMAULIPAS. In July, 1907, the state of Tamaulipas was credited with the possession of eleven copper mines, of which only one or two are of present importance. There are copper deposits at a number of points in this state.

TEPIC. In July, 1907, the government statistics of Mexico credited the territory of Tepic with the possession of two copper mines, and there are mines of other metals carrying material copper values. Copper ores exist at a number of points in this territory, though the principal mining industry is based upon gold.

TLAXCALA. There are no recorded copper mines in the little state of Tlaxcala, but beds of copper ore outcrop near Monte Tlatlay.

VERA CRUZ. There are no copper mines in the state of Vera Cruz, but copper ores have been found in the district of Zomelahuacán, and probably exist at other points as well.

YUCATÁN. It is reported, though the statement does not seem fully verified, that for some centuries the Maya Indians have worked cop-

per mines, in a crude way, in the interior of Yucatán. The greater portion of this state was held, practically undisputed, by the war-like Mayas, from the time of the Moctezumas until a recent period, the Spaniards finding it easier to leave the aborigines in undisputed possession of their territory than to attempt a conquest. Under the wise and pacific government of Don Porfirio Diaz the extension of the power of the Federal government over the entire state of Yucatán has been accomplished with very little bloodshed, through the exercise of great tact, patience and firmness. The interior of Yucatán is wild and little explored, but it is probable that considerable mineral values exist.

ZACATECAS. According to government records there were fourteen copper mines in the state of Zacatecas in July, 1907, the principal copper producing districts being those of Mazapil and Conception del Oro, south of Saltillo. The mines of Mazapil show a considerable variety of copper ores, existing in large quantities, and this is a field of promise. The Bolaños and Ramos districts also are of slight present importance, and of considerable future promise.

CHAPTER XVII.

Copper Deposits of Central America and the Antilles.

In this chapter detailed references are made to the copper mines and copper producing districts of Central America and the West Indies. While the production from this field is small, these countries are not devoid of ore bodies of considerable promise.

COSTA RICA. Las Concavas mine, opened in the Eighteenth Century, or possibly earlier, was a small copper producer, at intervals, for many years, but has been idle for some time. There are outcrops of copper ores at several points in the republic, but no serious attempt at mining has been made except at Las Concavas. With the present large investment of foreign capital in Costa Rica, and the rapid extension of transportation facilities, further attempts at the exploitation of copper deposits would seem only a matter of time.

CUBA. The first American copper mines worked by Europeans are said to have been in Cuba, in the province of Santiago. There are copper mines, now idle, in the provinces of Matanzas, Pinar del Rio, Puerto Principe, Santa Clara and Santiago.

In the province of Matanzas copper ores are noted at El Recreo, a vein of one to twenty inches width having been traced for a distance of about a quarter of a mile.

In the province of Pinar del Rio copper is noted near Arroyo de Manta, in the form of chalcopyrite associated with pyrrhotite, and with occasional chalcocite, occurring as lenticular chutes in metamorphic schist, and carrying strong limonite gossans.

In the province of Puerto Principe there are small mines that were worked many years ago, on fissure veins carrying chalcopyrite with quartz gangue, but none of these seem of especial promise.

The province of Santa Clara has copper ores at various points, including several localities northeast of Cienfuegos, and old copper mines are found at San Juan de Malaja, 6 miles northeast of the city of Santa Clara, and at the Finca San Joaquin, 12 miles west of Manicaragua, and also a short distance from Cumanayagua.

The mines of El Cobre, 8 miles west of Santiago Bay and about 30 miles north of Santiago de Cuba, were opened by the Spanish, A. D. 1532, the first production having been used for the casting of bronze cannon. The various mines were consolidated, in 1832, in the hands of an Anglo-Spanish company, and were worked until the plant was burned by insurgents, in the Cuban rebellion of 1868, producing, according to the custom-house records of Santiago, 610,200 tons of ore, exported to Swansea, averaging about 16 per cent. in copper tenor, and valued at $30,186,225, probably in depreciated Spanish currency. The ores of the Minas de Cobre occur in a mineralized zone of about 200 feet width, and of at least a mile

in known length, the belt showing several parallel veins, with rocks between much altered, the ore occuring as chutes with extreme widths of about 20 feet, and lengths of 20 to 200 feet, along fracture veins in serpentine. The ore is primarily chalcopyrite, associated with pyrrhotite, with quartz gangue, the grains of chalcopyrite frequently being coated with covellite.

GUATEMALA. The republic of Guatemala possesses considerable mineral wealth, but owing to lack of transport and rugged topography, mining development is limited, being confined mainly to placer gold mining. With the completion of the Ferrocarril Guatemala del Norte, various cupriferous districts will be rendered accessible, and doubtless copper mining developments will follow. There were small copper mines in Guatemala under Spanish domination, as early as the Seventeenth Century, but metallic production was mainly silver.

Small veins carrying massive malachite occur near Ravinal, in the department of Baja Verapaz, also near Cabulco.

In the department of Chuquimula, in eastern Guatemala, there are copper deposits, claimed to average 5 to 20 per cent. copper tenor, but these are idle, though they will be available for exploitation on the completion of the new northern railway. This department is mountainous and isolated, but apparently rich in minerals.

In the department of Huehuetanango, on the southern slope of the Cuchumatanes Mountains, there are contact veins between limestone and granite, showing high grade carbonates. Near Chiantla there is an occurrence of copper ore said to resemble that of the Santa Fé mines of Chiapas, in Mexico. There are developed silver-lead mines in this department.

Copper carbonates are found in sedimentary beds not far from the city of Guatemala, in the department of that name.

HAYTI. There are deposits of copper ore at various points in the republic of Hayti, notably in the Hotte Mountain range, in the southern part of the island, and extensive deposits of copper ore, in and near igneous rocks of andesitic nature, associated with Tertiary limestones, are said to occur at Terre Nueve, about 10 miles from the seaport of Gonaives. There also are exposures of copper ore at Grande Riviere, south of Le Cap, 6 to 10 miles south of the sea, and at Limonade, copper ores carrying platinum, iridium and osmium are noted. Previous mining developments have been of the crudest, but efforts are now being made to develop a copper property along modern lines, with American capital.

HONDURAS. Copper ores occur in nearly every department of this republic, but development is limited, and the mines are of small size. There are copper mines in the departments of Tegucigalpa and Comayagua. In the department of Yoro, in the northwestern part of the republic, promising deposits of copper ore are reported from a district about 40 miles from the Ulloa river. This district is said to show a vein up to 14 feet in width, claimed to be traceable for miles, giving ores assaying 15 to 16 per cent. copper, which seems a statement liable to reduction.

JAMAICA. There is a cupriferous district near the middle of the island, showing several veins of 3 to 4 feet width, on which a little ex-

ploratory work was done, and from which one small shipment of ore was made, circa 1854. Since that date there have been repeated efforts to organize mining companies, and develop mines, but no permanent results have been secured. Apparently the deposits first opened were of small extent and of low value. There are indications of copper and other metals at various other points in the island.

LEEWARD ISLANDS. Copper ore has been noted on the island of Virgin Gorda, one of the Virgin Island group.

NICARAGUA. A very small amount of copper is produced in Nicaragua, as a by-product from the smelting of silver ores, the copper acting as a carrier in the matting of argentiferous sulphides. Occurrences of copper ore are noted along the Atlantic coast, and there are cupriferous belts on the Escondido and Mico rivers. The most promising ores are noted in the department of Segovia, but development is rendered difficult by a mountainous country and poor roads. Copper ores are noted also in the vicinity of Jinotega in the department of Matagalpa, in the department of León, and near Prinzapulca, on the gulf coast, in the department of Zelaya.

PANAMÁ. This newest of American republics has deposits of copper and other minerals, but lacks developed copper mines.

PORTO RICO. Copper mining in Porto Rico begun in 1869, when La Abundancia mine was opened, in the barrio of Rio Blanco, and this was followed by the exploitation, on a small scale, of several adjacent properties. The Rio Blanco deposits carry a vein of pyrrhotite of 6 to 10 feet width, with a paystreak of 8 to 15 inches, mineralized with bornite and chalcopyrite, the paystreak averaging 10 to 12 per cent. copper. Work was abandoned because of the heavy cost of transportation, after several hundred tons of rich ore had been produced. Copper outcrops are noted at various points along the mountain range that crosses the island from east to west, the richest being in the barrio of Rio Blanco.

Since the American occupation, numerous mining claims have been filed, but no actual mining has been done, except a little placer work for gold. At the end of 1906 eleven claims had been filed for copper, and one for iron and copper, these being mainly in the western end of the island, in the departments of Mayaguez, Arecibo and Ponce.

SALVADOR. Copper ores are noted in the department of Chalatenango, near the Honduranian frontier, and some attempts at mining in a crude way have been made. There also are copper ores near Melapán, in the department of Santa Ana.

SANTO DOMINGO. A little mining for copper is said to have been done by the Spanish, during the Eighteenth Century, but such operations must have been conducted on a small scale. The Sierra de Differencia, constituting the backbone of the island, shows copper ores at various points, the most important occurrences noted being near the Jaina and Nigua rivers, in the province of San Cristobal, on the northern side of the island, and on the southeastern flanks of the mountains, in the same province, about 25 miles northeast of the city of Santo Domingo. At the latter point ores are said to occur in tuffs, near the point of contact with Cretaceous limestone, the ores being chiefly chalcopyrite, associated with limonite, with some malachite and brochantite.

CHAPTER XVIII.

Copper Deposits of South America.

The cordillera of the Andes carries copper from its northern end in Columbia to Punta Arenas, at the southern tip of the continental mainland. Apparently the copper ores favor the western slopes of the cordilleran belt, as the principal mining fields lie mainly along the coast range, or between the coastal and central mountain ranges, largely in the tablelands between these two Andean ranges. There are occurrences of copper ore in Argentina and elsewhere, on the eastern slopes of the Andes, but these apparently are of less importance than the copper measures to the west. The principal cupriferous developments in South America are in the Republic of Chile, with Perû a good second, and there is every reason to believe that not only these, but other countries, will become increasingly important producers of copper.

ARGENTINA. The republic of Argentina has copper mines in the province of Buenos Aires, near the capital, which apparently are of small extent and little promise, and in the Andean provinces of Catamarca, Córdoba, Jujuy, Rioja, Salta, San Juan and Tucumán, of which the more important are in the province of Rioja. All of the latter named provinces are in the northwestern part of the republic, lying on the eastern slope of the Andes, in a rugged district offering serious obstacles to economical transport.

The production of copper by Argentina has been small for many years, but eventually should become important. The ores are mainly sulphide, but, like those of the eastern slope of the Andes, run largely to arsenical and antimonial forms, enargite being an ore of frequent occurrence.

In the province of Rioja is found the Famatina district, in a field of only about ten by fifteen miles area, which includes the Mexicana, Tigre, Caldera and Cerro Negro sub-districts. The Sierra de Famatina is a great mass of metamorphic rocks, 60 to 100 miles in width, with peaks of nearly 20,000 feet in height. Near Chilecito is a vast upheaval of geologically recent eruptives, showing copper ores in fissures. The district is very rugged, and difficult of access and transport. The mines of the Mexicana district occur at elevations of 13,100 to 14,800 feet, the veins being numerous, narrow and rich.

The Capillitas district, in the province of Tucumán, is very small, having an area of about 4 square miles only. The topography is exceedingly rugged, and there is no wood, and no water, except in the mines, which can feed the boilers, but are unable to supply water for mills. The Cerro de Capillitas shows a mass of fissure veins, forming almost a gigantic stockwerk, in granite, gneiss and porphyry, with a capping of trachyte. The ores developed are cuprite, melaconite, azurite and malachite, with a limited amount of bornite and occasional highly argentiferous tetrahedrite. It is probable that chalcopyrite will come in at greater

depth, but the richer ores in the alteration zone evidently are of considerable depth, and are both auriferous and argentiferous, as a rule..

BOLIVIA. Mines of both silver and copper were worked in Bolivia by the Incas. Geological conditions are somewhat similar to those found in the adjoining countries of Perú and Chile, but the exploitation of Bolivian copper mines has been hampered by a variety of disadvantages. The mines lie in the high cordilleran plateau and lack of rail transportation has been a serious drawback, but arrangements were made, in 1906, between the governments of Bolivia and Chile, for the construction of a rail line from Arica to La Paz, with a branch to Coro Coro, and the completion of this line cannot operate otherwise than as a great stimulus to production from the rich mines of the Coro Coro district. Most of the copper produced in Bolivia is shipped through the Peruvian port of Mollendo, though occasional shipments are made by way of Tacna, a Chilean port. The mining districts of Bolivia are arid, as a rule, and but slightly developed outside of Coro Coro.

There are copper mines in the departments of Aurora, La Paz, Litoral, Lipez Norte, Lipez Sur, Oruro, Pacajos and Potosí.

There are copper ores and mines at several points in the department of La Paz, but the most important mines of the department, and of the republic, are at Coro Coro. These mines are believed to have been worked by the Incas. The district is arid, and the only available local fuel is ouiga and cagajon. The nearest water supply is the Desaguadero river, 14 miles distant, which is a navigable stream, and copper is shipped by way of the port of Desaguadero. The Coro Coro district lies in the basin of Lake Titicaca, in the cordillera of Chacarilla, between the Andes to the eastward and the Cordillera Real, or coastal mountain range, to the west. This district shows two dissimilar sedimentary strata, apparently of different geological horizons, similar only in their origin and cuperiferous nature. The older and underlying formation, Las Vetas, is an arenaceous conglomerate of argillaceous tendencies, having a generally northeasterly trend. Superimposed upon this stratum is another conglomerate, Los Ramos, having a generally southwesterly trend. The upper conglomerate is much like the lower, but is darker in color and mottled with red and white particles of gypsum and other minerals in the older stratum. The country rocks are eruptive, mainly dioritic, and the copper occurs native as a rule, and but rarely as ores in quantities of commercial importance. The conglomerates range from 2 to 6 feet in thickness, with an extreme thickness of 30 feet in the Veta El Dorado, which has a minimum width of about 1 feet. These conglomerates carry native copper averaging about ?.5 per cent. with copper ores in small quantities, mainly chalcocite and domeykite, scattered irregularly through the beds, and native silver occurs sparingly. The mineralized district has been proven for about one-half mile in width and for about 5 miles in length, but traces of copper are noted for a considerably greater distance, and about 25 miles to the southeast what apparently is a continuation of these beds has been found, and mined slightly, while the same formation also outcrops still further south, in a region west of Poopo. The southerly continuations of the Coro Coro belt are difficult of access, though of considerable promise. The native copper occurs usually in small nodules, though masses, commonly of small size,

but sometimes large, are encountered at times. The silver associated with copper is mechanically admixed, but not alloyed, this method of occurrence of the two native metals being the same is in the Lake Superior district.

The Bolivian government estimates the average cost of copper production from the Coro Coro district, per quintal of practically one hundredweight, averaging 80 per cent. in copper tenor, at 5.34 bolivars for mining, 3.27 bolivars for milling and 1.39 bolivars for general expenses, a total of 10 bolivars for 80 pounds of fine copper. Cost of transportation to the coast averages 3.24 bolivars via Tacna, and 2.87 bolivars via Mollendo, the latter port taking the major part of the exports, with an average cost of ocean freight to European smelting ports of 2.78 bolivars per quintal, giving an average cost of 15.6 bolivars at Swansea and other principal British smelting points, with an average European price of 20 to 22 bolivars per quintal.

The departments of Lipez Norte and Lipez Sur show extensive remains of Inca workings, obviously for silver, with evidences of later operations by Spaniards. There are promising deposits of highly argentiferous copper ores in these departments.

The smelting point for the mines of Huanchaca, department of Potosí, is at Pulacayo, on the line of the Antofagasta & La Paz railroad, at a distance of 184 miles from the first named city. The Huanchaca mines lie at an elevation of about 17,000 feet. The vein is 3 to 9 feet wide, in intrusive micaceous andesite cutting Silurian slates. Pay ore occurs in chutes, and is mainly highly argentiferous tetrahedrite, associated with chalcopyrite, sphalerite, galena and pyrite, all argentiferous, with quartz and barite gangue. Selected ore is shipped to Antofagasta, where smelted, or forwarded to New York for reduction. Selected ore averages about 6 per cent. copper, 8 per cent. lead, 16 per cent. zinc and 1.5 per cent. silver.

The department of El Litoral is included by the Bolivian government in its copper statistics, but inasmuch as this department has been occupied by Chile since 1879, and is now part of the Chilean province of Antofagasta, and will not be given up by Chile except to superior power, which Bolivia lacks, its inclusion in any article dealing with Bolivia must be considered a patriotic reminiscence, rather than a fact of present importance.

BRAZIL. The existence of native copper and of various copper ores in Brazil has been known for many years, but few systematical attempts have been made at mining, until within the past few years, and official records are lacking in most cases. In fact, but for private enterprise very little authentic information would be available, and credit is due to Prof. A. J. de Souza Carneiro, of Bahia, for much of the information that has been gathered regarding Brazilian copper deposits.

The immense size of the republic of Brazil renders it altogether probable that deposits of copper will be found at numerous points, in addition to those now noted, and as a fair beginning has been made on copper mining and smelting, under modern conditions, in the state of Rio Grande do Sul, it is probable that this republic will become, sooner or later, a considerable producer of the metal.

A mass of native copper weighing 2,616 pounds was found many years ago in the neighborhood of the city of Bahia, in the state of that name, and now reposes in the royal museum at Lisbon. This state contains numerous copper deposits, but the only active mines of importance are at Carahyba. There are about a dozen districts in the state of Bahia where copper ores have been found in greater or less profusion, and in the majority of cases these copper measures would seem worthy of careful investigation. In addition to the mines of the Carabyba district, copper has been found to the north, near the Cerro de Barracha district, also at Patamuté, Urtigis and Curaçá. In the central part of the state copper ore exists at the Cachoeira do Inferno and at Jacobina. In the western part of the state copper ores occur at Chapa da Velha, and in the eastern part ores are known on the Paraguassú river, near Cachoeira, at points near the city of Bahia, at Belem, Genipapo and Murihiba. In the south central part of Bahia copper has been found at Maracás, and in the southern part at Condeuba and along the line of the Rio Verde, near the boundary of the state of Minas Geraes.

In the state of Ceara copper ores exist at a number of points, and have been worked to a slight extent. The principal occurrences are near Buhira, in the municipality of Bucuosa, where abandoned explorations show native copper and cuprite. Copper also exists in the Cerro Cantagallo.

In the state of Goyaz various deposits of copper ore of more or less promise are noted on the Jaurie River.

In the state of Maranhao there are rich copper ores at a number of points, notably in the municipality of Chapado.

In the state of Matto Grosso copper ores of considerable promise are exposed at various points along the Jaurie River, which forms the boundary line between the states of Matto Grosso and Goyaz.

In the state of Minas Geraes, long noted for its gold mines, the occurrences of copper ore probably are of greater promise than are noted in any of the other Brazilian states except Rio Grande do Sul and Bahia. The principal occurrences are noted near Ouro Preto, Sete Lagoas and Lavras. At the latter point copper deposits, found in 1901, gave assays running up to 75 per cent., and a little mining work was done thereon.

In the state of Paraná copper deposits are known at Campo Largo, in the Curapuava district and along the river Parapanema.

In the state of Rio de Janeiro copper ores are noted in the vicinity of Campos and Sao Joao do Barra.

Copper exists in the northern part of the state of Rio Grande do Norte, near the boundary of the state of Ceara.

In the state of Rio Grande do Sul are found the principal Brazilian copper mining operations of the present day, at Camaquam, 3 kilometers from the Rio Camaquam, and about 80 kilometers from Rio Negro, a station on the Southern Brazilian railway. The formation shows an intrusive core of melaphyr, surrounded by conglomerate, ore occuring in the latter as chalcopyrite associated with pyrite, with occasional particles of chalcocite and showing occasional dendrites of native copper, gangue being of quartz. The veins occur as fissures in conglomerate and extend to the adjacent sandstone, but therein are not as rich as in the conglomerate, where four ore bodies are being worked.

These lack regularity, and even continuity, having an average width of about 4 feet and giving average assays of about 6.5 per cent. copper and 30 grams of gold, per metric ton. Elsewhere in this state copper ores are noted at Cacapava, where two small mines have been opened, and at Guarahina, Sao Gabriel, Cerro Martino and Cerro do Geraldo.

In the state of Sao Paulo chalcopyrite associated with sphalerite and galena has been found, in limestone, near Paranahaiba, but attempts at mining were abandoned, as the ore was found in small pockets only. Copper occurs also in the Sporanga Mountains.

CHILE. This country was, about the beginning of the last quarter of the Nineteenth Century, the largest copper producer of the world, but now holds only sixth place, having been passed by the United States, Mexico, Spain, Japan and Australia. The copper output of Chile has decreased, not only relatively, but actually, owing mainly to the exhaustion of the principal bodies of oxidized ores in the older mines. From this decline in output it must not be inferred that Chile is exhausted as a copper producer; on the contrary, the possibilities of copper production are greater than in almost any other country except the United States, Mexico, Canada and Australia. It will be necessary in the future, however, to obtain a much larger proportion of the product from sulphide ores than has been gained in the past. The production from sulphides of low and medium copper tenor is increasing, and with the increase of railroad facilities, and the better equipment of mines and smelters along modern lines, Chile must become an increasingly large producer of copper. The largest annual production ever made was about 43,000 long tons of fine copper in 1882, and total production from 1844 to 1900, inclusive, is estimated at 1,830,000 long tons of fine copper.

Copper deposits were worked in a limited way before the first white man set foot on the soil of Chile, and a little metal was produced under Spanish domination, but the industry did not gain real importance until during the fourth decade of the Nineteenth Century, after the gaining of independence. Until 1842 the high grade oxide and carbonate ores were smelted in charcoal furnaces, but in that year the first reverberatory furnace was built by Charles Lambert at Coquimbo, and in 1857 the first blast-furnace was built by the same pioneer. The period of greatest prosperity of the Chilean copper industry includes the three decades from 1850 to 1880, followed by twenty years of slow but fairly steady decline, with a turn of the tide, followed by improvement, setting in with the beginning of the Twentieth Century.

In 1903, according to the official records of the republic, there were in Chile patented mines as follows: copper, 7,106; gold and copper, 124; silver and copper, 427; copper and iron, 16; copper and lead, 4; gold, silver and copper, 38; silver, copper and lead, 14; silver, copper and cobalt, 1, a total of 7,730 cupriferous mines. The number of working properties was 748, not quite 10 per cent. of the total. In this connection it should be explained that a mine in Chile consists of one hectare, or pertenencia, many of the properties including a considerable number of pertenencias. The mining laws are very liberal, and the government cannot be accused of retarding the mining industry. Each holder of one pertenencia, of practically two and one-half acres, is taxed $10 yearly, and, after officially

surveyed, the property is freehold as long as taxes are paid regularly. Transportation facilities are poor, and there is considerable complaint of dishonesty and favoritism in the management of the state railroads.

Chile has two parallel copper belts, running nearly due north and south, along the axis of the Andes, these belts being approximately one hundred miles apart. The principal developments have been secured in the western or coastal belt, because of better transportation facilities. The cupriferous fields of Chile show mainly strata of the Permian system, with sandstones predominating. These have been much faulted, twisted, broken and upheaved by eruptive rocks, largely diorite. The auriferous copper veins of Atacama and Coquimbo usually are associated with highly silicious eruptives, while the argentiferous copper veins are associated commonly with diabase. General geological conditions are somewhat similar to those of the Mansfeld district of Germany, and in the Ural Mountain range of Russia, though the topography of Chile is much more rugged. The cordilleran belt, on the main chain of the Andes, lies back from the coast some distance, and the country is so mountainous, and the altitude is so great, and transportation facilties so poor, as a rule, that mining developments are on a scale that is trival, compared with the possibilities of great production from this belt. The two parallel cupriferous belts stretch from Perú on the north to nearly the southern end of Chile, in what formerly was called Patagonia, a wild country that has been divided between Chile and Argentina, the Andes forming the line of division. In the desert regions comprising the greater part of Chile, the oxidized zone usually is of great depth.

There are copper mines in the provinces of Aconcagua, Antofagasta, Atacama, Colchagua, Coquimbo, O'Higgins, Santiago, Tacna, Tarapacá and Valparaiso, with copper ores known to exist in practically all of the other provinces. Antofagasta, Coquimbo and Atacama lead in production and in the number of important mines.

The principal copper mines of the province of Aconcagua are in the department of La Ligua, where there are a number of important mines, and in the departments of Petorca and Putaendo.

In the province of Antofagasta there are mines of importance in several districts, including Calama, San Pedro de Atacama and Tocopilla, the latter being an old field. Important mines are being opened in the department of Gatico, under modern methods. In the Chuquicamata district the copper mines were worked originally for atacamite, this assaying 2 to 3 per cent. only in copper, but being reduced easily. Developments at depth, however, have shown much richer ores, ranging from 5 to 20 per cent. in copper tenor, and important developments are under way. The center of this field, 163 miles by rail from Antofagasta, has an average elevation of about 9,000 feet above sea-level. The richer ores, principally atacamite, occur in small veins, with gangue of quartz and feldspar, and ore as now mined averages 10 to 12 per cent. copper. In the Taltal district the rich gold mines of Guanaco have become copper mines at depth, a phenomenon noted at numerous other points in the world.

The province of Atacama has copper mines in a large number of departments and includes several of the most important copper districts of Chile. The ores mined in this province must average about 6 per cent.

in copper tenor to be profitable, unless specially suited for fluxing purposes, in which case lower grades are utilized. Labor is inefficient, and power drills run by compressed air prove unsatisfactory, owing to the great altitude, while electric drills, for some reason not apparent, have not given satisfactory results. The department of Copiapó has a number of famous old producers, and some new mines of importance. Production in 1903 was 6,605 metric tons fine copper, from about 40,000 tons of ore, giving an average extraction of better than 15 per cent. for the entire district. The department of Chañaral was the second largest producer in 1903, ores as smelted giving average returns of 8.6 per cent. copper. The Cerro Blanco district is in the cordillerean zone, with mines mainly in trachyte, opened for silver, but changing to argentiferous copper values at an average depth of about 600 feet, and deeper to copper sulphides of good average value, the deepest workings being about 1,500 feet. In the department of Chañaral there are old and important mines, and the departments of Carmen Alto, Carrizal Alto, Freirina, Puquois and Vallenar have copper mines of importance.

In the province of Coquimbo there is very general complaint about of San Vicente, but there are copper ores at numerous other points.

In the province of Coquimbo there is a very general complaint about both the scarcity and inefficiency of labor. In this province there are important mines in the departments of Coquimbo, Combarbalá, Guayacan, Illapel, La Higuera, Ovalle, Tamaya, Tongoy and Vicuña.

In the territory of Magallanes, in the extreme southern part of Chile, two veins of 5 to 7 meters in width have been found, carrying bornite and chalcopyrite, associated with hematite and limonite, with a quartz gangue.

In the province of O'Higgins there are copper mines, of more or less importance, in the vicinity of Rancagua.

In the province of Santiago the principal copper mines are at Lo Espejo and Melipilla, and in the department of Victoria.

The province of Tarapacá has copper mines, mostly small, near Iquique, Huantahaya, Huara and Tarapacá. Production by these mines is small, though they are by no means devoid of promise.

In the province of Valparaiso there are copper mines of some present importance, and of considerable future promise, near Llai-Llai and Quillota.

COLOMBIA. The production of copper is an industry of great age in the republic of Colombia, but one that never has assumed great importance. Considerable copper was secured during the centuries of Spanish government, mainly from the rich oxidized ores at and near surface, extracted and smelted along primitive lines. There are old copper mines in the provinces of Antioquia, Tolima and Boyeca, the mines of the latter producing a little copper for purely domestic uses. Copper also is found in the departments of Bolivar, Cauca, Cundimarca and Santander. The principal deposits of Cauca are at San Lorenzo, Yocoto, Coli, Pichinche and Andagueda. In the province of Colima copper ores exist near Anchique, and at Nacoroco, southwest of Natagaima. With the improvement of transportation facilities, and the introduction of foreign capital that will follow the more settled political conditions brought about by the wise government of General Rafael Reyes, the copper industry of Colombia,

now of merely academical interest, should take upon itself proportions of commercial importance.

ECUADOR. This republic has copper deposits in the provinces of Azuay and Loja, and an attempt at mining on a modern scale was made, some years ago, but did not prove successful. Mining operations are confined mainly to the production of gold from a number of small mines, and copper ore is found frequently in small quantities in these mines. It is altogether probable that Ecuador possesses copper deposits of prime importance, in its mountainous mining fields, but developments to date are trivial.

PARAGUAY. There are deposits of copper ore at various points in the northern part of Paraguay, from which specimens of native copper have been taken, but no mines have been opened. Copper ores also are noted near Incarnacion, in the southern part of the republic.

PERÚ. This country was a small producer of copper for some hundreds of years, but about the middle of the Nineteenth Century the industry fell into decay, and its rejuvenation dates from shortly after the decline in the price of silver, around 1885, which caused the mines of the Cerro de Pasco district to utilize their rich ores of copper, previously thrown aside in the search for silver values. The immense investment of American capital in the Cerro de Pasco district, estimated at $17,000,000 gold, promises to revolutionize the copper industry of Perû. Among the disadvantages of Peruvian mining are the tremendous height of the mountains, which have taxed the engineering skill of man to pass, the lack of fuel in certain districts, and the inefficiency of labor, which is inclined to be both drunken and lazy, a state of affairs scarcely to be wondered at, in view of the padrone system in quite general use.

Perû is the second largest copper producer in South America, and in 1906, made 13,474,332 kilograms fine copper, a gain of 1,261,332 kilos over the preceding year, the production amounting to about 2 per cent. of the world's total supply of the metal. According to the official Peruvian statistics of 1900, there were in Perû 104 copper mines, 104 mines of silver and copper, and 2 mines of gold, silver and copper, which number had increased, in 1905, to 349 copper mines, 1,022 silver and copper mines and 351 copper and lead mines, a total of 1,722 cupriferous properties, showing a gain of more than 700 per cent. in five years.

Perû has the usual ores of the Andean cordillera, with geological surroundings similar to those of Chile. Copper ores are scattered all along the Peruvian Andes, and down to the coast. The principal ores are bornite, chalcopyrite, enargite and tetrahedrite, there being an unusual proportion of arsenical and antimonial minerals among the minor ores, found in considerable quantities in various places, with occasional native copper, cuprite, malachite, bournonite and chalcanthite, usually associated with sphalerite and frequently with galena, all ores being more or less argentiferous.

In addition to copper ores in practically all of the other departments, Perû has copper mines in the departments of Ancachs, Arequipa, Cajamarca, Huancavelica, Huánuco, Ica, Junín, Libertad, Lima and Puno.

In the department of Ancachs the production of fine copper in 1906

was 440 metric tons, the district of Pallasca leading with 229 metric tons, followed by Recuay with 154 metric tons, balance of production being from the districts of Bolognesi, Cajatambo, Huallas and Huari.

The department of Arequipa produced 102 metric tons of fine copper in 1906, from the districts of Arequipa, Acarí, Camaná and Islay, the formerly important district of Acarí furnishing less than 9 tons of this small output.

The production of the department of Cajamarca, in 1906, was 162 metric tons, the Cajabamba district leading with 137 tons, with small products from the Contumazá and Hualguayoc districts.

In 1906 the production of fine copper from the mines of the department of Huancavelica was 254 metric tons, the district of Castrovirreina leading with 234 metric tons, followed by small products from the districts of Angaraes and San Juan. This department, which lies a long distance nearly due south of Cerro de Pasco, shows copper ores in promising quantities, mainly in eruptive rocks. The ores smelted in 1905 averaged about 25 per cent. copper, and 0.1 to 0.135 per cent. silver.

The department of Huánuco produced, in 1906, fine copper to the extent of 235 metric tons, of which the district of Huánuco made 141 metric tons, and the district of Huallanco 94 metric tons.

The 1906 production of the department of Ica was only 28 metric tons fine copper, all coming from the district of Ica, which was worked extensively at one time, but was practically abandoned in 1892. The largest mine was the Canza, with selected ores averaging about 30 per cent. copper, lower grades being rejected. Disadvantages in this district are lack of water and of decent roads for transportation.

The department of Junín is much the most important copper field of Perú, and is of great promise. The output of fine copper, in 1906, from the various districts of this department, was 9,440 metric tons, of which 6,741 metric tons came from the Cerro de Pasco district, with 2,697 metric tons from the Yauli district. The district of Huancayo produced only 2,156 kilos fine copper.

The Cerro de Pasco district, worked for nearly 300 years for silver, and an enormous producer of that metal, has become a very important copper field, since 1890, and is now mainly in the hands of a single American corporation. Unlike most of the other Peruvian mining fields, which are arid, there is an excess of water at Cerro de Pasco, and there are numerous streams that could be made to furnish power. Timber is scarce, except in a few districts difficult of access, but coal of fair quality is found in abundance, within 20 miles, and a branch railroad has been built to the coal fields. An extension of the Meiggs railroad has been built from Oroya to Cerro de Pasco, cutting to a comparatively trivial sum the former freight rate of $40 per ton for this distance, all transportation having been on the backs of mules and llamas. The Cerro de Pasco district is a basin of approximately one mile width and two miles length, entirely mineralized and bounded on the west by andesite, with limestone on the three other sides. The formation is in some doubt as to age, but apparently is lower Cretaceous, with strata of slate, sandstone and limestone, upon which is superimposed a mass of limestone conglomerate, of marshy rather than marine origin, fractured by eruptive acid andesite rocks, that

in many cases engulf the sedimentary strata, the limestone being highly metamorphosed. Apparently the entire basin in a mammoth stockwerk, with impregnations of silver and copper ores, the ore occurring in immense pockets, up to hundreds of thousands of tons in weight, and largely, though less frequently, in veins. The deposits are said to be metasomatic at the western end, east of the andesite, occurring mainly as veins in or near the andesite, while to the eastward, west of the limestone, the ore occurs in large pockets, in and near the limestone. The alteration zone is 200 to 300 feet in depth, succeeded by a zone of lean cupriferous pyrites, followed in turn by highly argentiferous sulphides and arsenides. Below the water-level the ores include bornite as well as chalcopyrite, with considerable tetrahedrite, associated with sphalerite, galena, arsenopyrite and pyrite.

The Huayllay division is about 25 miles southwest of Cerro de Pasco, at an elevation of about 15,000 feet. Copper occurs at various points, mainly as enargite, with considerable tetrahedrite and some chalcopyrite. Bismuthinite is shipped in considerable quantities from one property, and there are a number of old copper mines, mostly small, in this field.

The Yauli division of the Cerro de Pasco district is a short distance east of Oroya, the principal copper deposits occurring between wollastonite strata and andesitic rocks, such as dacite and prophyllite. The Morococha sub-district of the Yauli division has a number of important producing mines, and is located on a 10-mile spur of the main line of the Oroya railroad that runs from the western end of the Galera tunnel, which passes under Mount Meiggs. The Yauli mines, including the Morococha sub-division, are located at an average elevation of more than 13,000 feet above sea-level.

The department of Libertad produced, in 1906, only 74 metric tons fine copper, of which 73,654 kilograms came from the district of Santiago de Chuco, and only 690 kilos from the district of Salpo.

The department of Lima is the second largest producer of Perú, having made 2,547 metric tons fine copper, all from the district of Huarochirí, in 1906.

The American consul at Iquitos writes that prospectors on the upper Maranón river, an affluent of the Amazon, found copper in the dumps of a half dozen abandoned mines, worked by Spaniards previous to the Peruvian War of Independence, at a distance of three weeks journey from Iquitos.

The production, in 1906, of the mines of the department of Puno, was 187 metric tons fine copper, all from the district of Lampa.

URUGUAY. Mining is but little developed in this republic, and while copper ores have been found at various points, no serious attempts have been made at developing copper mines.

VENEZUELA. Venezuela has produced no copper since 1894, but was a producer of importance at one time. Copper ores are known to occur in the departments of Baraquisimetó, Carabobo, Lara and Mérida, but the only mines of importance have been developed in the department of Lara.

There are traditions that the Quebrada mines, in the Aroa district of Lara, were worked by aborigines, before the coming of the Spanish. In the first half of the Nineteenth Century a Baltimore company operated

several of these mines, securing therefrom about 43,000 tons of high gra carbonate and oxide ores. Later the mines were taken over by local capita and circa 100,000 tons of medium and high grade ores extracted. Th principal period of production was in the years 1872 to 1894, when fi copper to the extent of about 65,000 tons was produced. The Quebrad mines are developed on the Narvaez or Bolivar tract, of 1,150 square mile between the Tocuyo and Yaracuay rivers, granted to one Narvaez, by th Spanish crown, in 1598, and passing, in 1802, by marriage, to the ownershi of Simon Bolivar, the liberator. The developed cupriferous portion of th tract shows strata of slate and limestone, intruded by various eruptiv rocks, the ore occurring in lenses, frequently of considerable width an length, and of unknown depth, the lenticular bodies occurring in seri with a strike of nearly north and south. The usual oxidized ores a found at and near surface, succeeded by chalcopyrite at slight depth.

The copper measures of Venezuela obviously are of importance, eve if judged solely by past production from a single district, and when th present unsettled and unsatisfactory political conditions are adjuste Venezuela will resume its position among the important copper producin countries.

CHAPTER XIX.

Copper Deposits of Europe.

The copper deposits of Europe are described briefly in this chapter, in alphabetical order, by countries.

AUSTRIA. Copper has been mined and smelted in Austria for centuries, and it is probable that copper mines were worked in Roman times. The industry is now of comparatively little importance, employing only about 1,000 men, with an average annual production of between two and three million pounds fine copper. The principal mines of Austria are in the Tyrol, where there are about a half dozen small mines in operation. In southeastern Bohemia there is an extensive area of sandstone and slate, containing veins carrying impregnations of copper ore, mainly chalcocite, and the Graslitzer mine of this district was perhaps the most celebrated copper mine of mediæval times. There also are a few small mines in Salzburg, near the city of that name.

BOSNIA. The production of fine copper from the mines of Bosnia was only 39 metric tons in 1905, a heavy falling off from the output of 237 tons in 1901, in which year the output was secured from 4,747 tons of ore smelted, giving an average extraction of almost exactly 5 per cent. A little ore is mined and smelted at Sinjako, and small quantities of ore are sent to Hungary for smelting.

BULGARIA. The principality of Bulgaria has copper mines in the provinces of Bourgos, Vidin and Vratza, and 1,400 tons of ore are estimated to have been produced in 1904. There are evidences of copper mining operations in Roman times, and possibly at an even earlier period. In the province of Vratza, near where modern mines are operated, there are considerable slag-piles, remaining from ancient smelters of a date so remote that no vestiges are found of the works themselves, and in other provinces there are similar but smaller slag-dumps, with waste-burrows containing mere traces of lean ore, the values of which have been leached most effectually by the rains of twenty centuries.

At Plakalnitza, in the province of Vratza, the ore is mainly bornite, with occasional chalcopyrite, and a little malachite in the upper workings.

In the province of Bourgos, chalcopyrite in considerable quantities is found at Kara Baïr, immediately west of the port of Bourgos, on the Black Sea, and there are remains of copper mining operations dating from some remote period. At Kara-Tepe and Soulon-Dere there are ores ranging up to 40 per cent. in copper tenor, on which some mining has been done, in no case exceeding 100 feet in depth.

At Belogradchik, in the province of Vidin, mines are being developed on ore bodies yielding mainly chalcopyrite. At Milkiovtzy, in the district of Trn, there are small ore bodies showing malachite, chalcocite and chalcopyrite, with gangue of barite.

In the department of Sofia, not far from the capital, in the extreme

western part of the principality, chalcocite is found at Gornya-Danya and at various other points. Native copper and rich oxidized ores have been noted in the districts of Sleven and Samakof, and elsewhere.

CORSICA. The island of Corsica has a cupriferous district about 20 miles wide by 50 miles in length, showing copper ores, mainly sulphide, in contact deposits between limestone and igneous intrusives. In this district there are a number of small and unimportant mines, mostly of considerable age, of which the Lancone mine was once a considerable producer. The present copper production of Corsica is trivial, coming mainly from a single small mine that ships about 200 tons of ore yearly to Great Britain.

CYPRUS. The Latin word cuprum, from which comes the English word copper, and its equivalents in most of the other European languages, is derived from aes cyprium, the earliest Latin name of copper, derived from the name of this island, where the Romans first secured their supplies of the metal, and it is probable that copper mines were worked by the Greeks before the Romans. The latest attempt at modern mining, early in the Twentieth Century, was in the vicinity of Limassol, but the island now has no active copper mines.

ENGLAND. English tin was known to the Phoenicians nearly or quite three thousand years ago, and copper has been produced, in all likelihood, for as many years as tin, the same veins carrying both metals, in Cornwall and Devon. At the close of the Eighteenth Century England occupied relatively the same position in the copper industry as held by the United States one hundred years later, producing 55 to 60 per cent. of the copper supply of the world, and, including the Welsh mines, then large producers, Great Britain was as important a factor in the copper trade, at the beginning of the Nineteenth Century, as North America is in the same trade at the present time. In 1799 the output of copper by English mines was 4,923 long tons, but had shrunk, in 1899, to 367 tons.

The mines of Cornwall and Devon, adjoining counties in the southwestern corner of the island, have been important producers of tin for a hundred generations, and it is no wonder that the Cornishmen are counted the world's best practical miners. A small, though relatively important production of copper, was secured from these counties during the middle ages, but systematic copper mining may be said to date from about A. D. 1700. The quantity of copper ore produced by the mines of Cornwall and Devon, during 126 years ending with 1865, was 7,844,305 long tons, valued at £50,964,388. The average yield for the last 70 years of this period was about 8 per cent. fine copper. The metalliferous belts of Cornwall and Devon may be considered as one geographically, occurring in a district showing metamorphosed sedimentary rocks, mainly clay-slates of the Devonian system, with frequent bosses of granite, both slate and granite being intruded by a quartz-porphyry of later age. There are numerous fissure veins cutting all of these rocks, these averaging 2 to 3 feet only in width, and frequently showing prominent gossans, the cappings being more numerous and stronger above copper ores than above the tin ores. The same veins carry ores of tin and copper, but there is a marked segregation of these minerals, governed by the nature of the wall-rocks, tin occurring mainly in portions of the fissures traversing granite, while copper favors

the slates. There are exceptions to this rule, and in places tin and copper alternate in occurrence, but, in the main, the metals favor the different rocks as noted. As a rule the veins are best mineralized where having the sharpest dip. The copper ore is mainly chalcopyrite, with quartz gangue, but the upper workings show the usual oxidized ores and native copper. One mass of virgin metal, weighing three tons, was secured from a mine near Mullion, Cornwall. The secondary sulphides are found to some extent, and copper silicates occur in small quantities, while there are occurrences of many of the rarer copper minerals, of scientific interest rather than of commercial importance.

The county of Cumberland was a producer of copper from a number of mines at one time, but these have been idle for a century or more. The Goldscope, in this county, was the most famous English copper mine during the Tudor era, working a fabulously large force of men to obtain the very moderate amount of copper secured.

The county of Cheshire contains numerous deposits of oxidized ores, averaging about 1.5 per cent. in copper tenor, disseminated in sandstone, which are not of present commercial importance, though possibly of future value.

There are deposits of copper in western Shropshire, along the Welsh border.

In Staffordshire the Ecton mine, owned by the Duke of Devonshire, was opened in Roman times, and was operated as recently as 1840. This was the first English mine to use gunpowder for blasting, in 1677.

The Laxey mines, in the Isle of Man, produce lead, zinc, copper and silver, the principal values being in the two metals first named.

FAROE ISLANDS. On the western side of the island of Luderö there are a number of superimposed cupriferous amygdaloidal traps. The copper occurs in thin vertical sheets, as virgin metal, of about one thirty-second inch in average thickness, and some of the gangue rock, from which metallic copper of appreciable size had been removed, assayed 1.88 per cent. copper.

FINLAND. The grand duchy of Finland, which, though closely bound to the Russian Empire, is not a portion thereof, as quite generally considered, has copper mines in the provinces of Viborg and Kupio. The most important is the Pitkaranta, on the northern shore of Lake Ladoga, in the province of Viborg, where mining dates from about the middle of the Nineteenth Century. The ore is mainly chalcopyrite, occurring in veinlets and disseminated in beds of "skarn," or sahlite, which is a granular mixture of augite, granite and ferromagnesian silicates, traversing granite. The ore body averages about 15 feet width, and is low in grade, but has been developed more or less extensively for about one and one-half miles in length.

FRANCE. There are no copper mines of present-day importance in France, the old mines of Chessy, which were famous properties and considerable producers in the middle ages, having been exhausted and idle for many years. In 1903 French copper production was 10,900 metric tons of cupriferous pyrites, of an average value of $13.25 per ton, a considerable portion of the value being in the sulphur contents, coming mainly from the department of Ariege, with a small output from the department of

Gard. The production is principally from mines of cupriferous pyrites a St. Bel, northwest of Lyons, where the ore occurs in series of lenses havin a known length of about 1,300 meters. One of the lenticular masses is o mammoth size, having an ascertained thickness of 140 feet, at the dept of 544 feet, with a known length of 1,968 feet, consisting of massive pyrit with a little intruded quartz, slightly cupriferous. There also are smal mines of argentiferous tetrahedrite in the department of Ariege, and i 1900 the production of such ore was 1,184 metric tons, valued at 612,39 francs, mainly in silver, sent to Great Britain for smelting.

There also are small copper mines in the department of Var, and i Savoy. There are very small copper mines in the department of Isere, an in the Basses-Pyrenees some exploratory and development work was don in the early years of the century. At Cap Garonne, near Toulon, there ar Permian quartz-conglomerates carrying a cupriferous bed of 2 to 4 fee thickness, the lower portion mineralized with chalcocite and melaconite.

GERMANY. In production and importance, the copper mines of Ger many rank second in Europe only to those of Spain, and the Germanic cop per industry is of considerable antiquity, the Mansfeld mines having bee important producers in the middle ages. In 1799 Germany produced onl 372 long tons of fine copper, nearly all from the Mansfeld mines, and on hundred years later made 20,875 long tons, of which about 90 per cent. wa from the Mansfeld mines.

There are copper mines of greater or less importance, and other mine carrying cupriferous values, in Bavaria, Brunswick, Elsass, Hanover, Hessen Nassau, Prussian Saxony, Rheinprovinz, Saxe-Coburg-Gotha, Saxe-Mein ingen, Saxony, Silesia, Weimar and Westphalia.

The copper mining industry of Saxony is of overwhelming import ance, values being secured mainly from a single property in a singl district, though there are cupriferous quartz veins in Schneeberg. The pro duction of Saxony, in 1904, was 710,911 tons of ore, from three mines, o which one, the Mansfeld, is one of the world's greatest copper producers while a second, the Rammelsberg, is of considerable importance.

The Mansfeld mines are at Eisleben, in the southern Harz Mountains In this portion of the Ober Harz the copper occurs in rocks of the Permia system, resting unconformably upon crystallized strata of Paleozoic rock the metalliferous bed lying in the Zechstein, a member of the Permian for mation. These horizons of the series consist mainly of unstratified gyp sum, associated with bituminous dolomitic limestones, beneath which is stratified fetid limestone, below which lies the true Zechstein, giving nam to the formation. At depth this passes into a bituminous marly shale, th lowest part of which, ranging from 18 inches to 3 feet in thickness, form the cupriferous strata, carrying disseminated copper sulphides to th extent of 2 to 5 per cent. copper, with an average tenor, as mined, of abou 2.8 per cent., and carrying an average of about 0.15 kilos silver per metri ton. Under the cupriferous shale is a calcareous sandstone-conglomerate sometimes carrying disseminated copper carbonates, and containing als small values in cobalt and nickel, all of the ore being more or less argentif erous. The copper-bearing shales of the Mansfeld district are about 20 square miles in area.

The Rammelsberg deposits, in the northern Harz Mountains, two miles south of Goslar, Prussian Saxony, occur in lenticular bodies of banded ore, with layers conformable to the bedding of the Goslar slate, in folded beds of Devonian age. The Rammelsberg is the second largest copper producer of the German Empire.

In 1904 the production of Westphalian mines was 47,718 metric tons of ore, secured from three copper mines and as a by-product from eighteen mines of other metals, and in the same year two copper mines in Silesia produced 1,760 metric tons of copper ore.

GREECE. The first Grecian copper mining was done at Chalkos, in the island of Eubœa, in semi-historic times, and the Greek name of the metal, chalkos, came from this source. The eastern coast of Attica shows argentiferous sulphide ores of lead and zinc, including the important silver-lead mines of Laurium, the argentiferous galena and sphalerite carrying occasional chalcopyrite. Copper ores occur in small veins only, as a rule, in eastern Attica, but in 1907 one copper mine was being worked, in a small way.

There are deposits of copper ore in Thessaly, but apparently these are not of large size or especial promise.

HERZEGOVINA. This country, nominally under Turkish suzerainty, but actually administered by the crown of Austria-Hungary, has a few small and exceedingly primitive copper mines, but none worthy of serious consideration, as now developed.

HUNGARY. Copper mining is an industry of great antiquity in the kingdom of Hungary, and there is a considerable number of old mines, mostly worked out or idle, and nearly a dozen copper smelters, all small and antiquated in design. Sulphide ores predominate as a rule. In 1901 the production of copper ore in Hungary was 161,547 metric tons, from 16 working mines, of which five produced the bulk of the ore won, and, of the larger producers, three mines were owned by the government and two were under private ownership.

There are copper mines in Transylvania, in the eastern portion of Hungary. The copper measures of the Banat, formerly worked for copper values, are now producers of iron ore only, though auriferous copper ores are found as contact deposits at the junction of garnetized Tertiary limestone and intrusive monzonite. At Herrengrund, north of Neusohl, near the Galician boundary, there are small copper mines, and at Dognacska there are very old and very small mines, that are limited producers of copper sulphides.

IRELAND. In 1906 the copper production of Ireland was about 3,000 tons of low grade cupriferous pyrites, valued at about £4,000 only, a considerable proportion of the values being in sulphur. At one time the Irish copper mining industry was of much importance, the production of the Connecree mines being 677 tons of fine copper in 1799, equivalent to nearly 8 per cent. of the world's production in that year, while in 1899 the Irish output was only 17 tons of fine copper, all obtained by leaching and cementation. The Irish copper ore sold in Swansea and Liverpool, from 1875 to 1882, amounted to 670,681 tons, of 21 cwts. each, valued at upwards of £1,000,000, but after 1882 the copper mining industry was practically extinct for

twenty years, though efforts are now under way to revive the industry. The Irish copper mines, however, have been material contributors to the progress of the industry, the wire rope tramways now in general use having been invented by Chas. Hodgson, of Wicklow, for use in the local mines, and the single rail was first utilized by Capt. Geo. Oates at the Cronnebane mine.

The Irish copper ores are mainly chalcopyrite and cupriferous pyrite, and there are copper mines in the counties of Cork, Kerry, Waterford and Wicklow, and in addition there are copper deposits in County Tipperary.

In County Cork the principal cupriferous districts are in the western part, including the Berehaven district, where mines were worked early in the Nineteenth Century, the Schull district and the Crookhaven and Kilcrohane districts.

The copper measures of County Cork extend into the adjoining county of Kerry, where mines have been opened at various points, including Ross Island in Lake Killarney. The Mountain and Keallonge mines, operated during the early decades of the Nineteenth Century, were each more than a quarter of a mile in depth, and were considerable producers in their day.

In County Waterford the Knockmahon mines were large producers at one time, the output of finished copper from the mines of this county exceeding 900 long tons in 1843. The ore is mainly cupriferous pyrite, occurring in large bodies in clay-slate, and, as selected, gave average returns of about 10 per cent. copper. The cupriferous measures of this county would seem worthy of serious exploitation.

In County Wicklow the Cronnebane mine was the principal property, and, as early as 1799, the Connecree mines yielded 677 tons of fine copper, rendering this one of the largest copper mines of that period. Copper mining practically ceased about 1840, but there was a small production of more or less cupriferous pyrite from the old copper mines for several decades later. In the Ovoca Valley of Wicklow, sulphide ores occur in clay-slates, as in the adjoining county of Waterford, and as in Cornwall and Devon. The ore occurs as chalcopyrite, in small veins, and as cupriferous pyrite, in lenses in Silurian slates, near granitic intrusives. The Ovoca copper belt is about six miles in length, and is of considerable promise, though the average grade of the ore is low.

ITALY. Copper was mined in Italy by the Romans several centuries before the Christian era, and, before their day, in semi-historic times, mines were worked by the Etruscans. The copper production was small during the middle ages, but the industry never has suffered complete cessation since its birth. Several of the Italian copper mines are well equipped, and managed with technical skill, and production is increasing. In 1902 the output of all Italian mines was 101,142 long tons of copper ore, and in 1907 probably was considerably more than twice as large.

The Italian copper deposits of commercial value occur mainly in the Appenines of Northern Italy, in the departments of Liguria, Piedmont, Tuscany and Venetia, those of Tuscany being of the greater importance. The principal mines are in the districts of Volterrano, Grosetto, Liguria and in the western Alps.

Principal developments and production are in the Grosetto district, where the largest Italian copper company is operating, in the vicinity of

Massa Marittima, the Massa Metallifera of Roman days. The Grosetto district lies ten to twenty miles southeast of Leghorn, in the foothills of the Etruscan Appenines. The principal ore bodies occur in fissure veins, in a great laccolith of gabbro and diorite intruding Eocene limestone, the intrusive rock being strongly basic, with an altered crushed zone of serpentine. In this district are to be found the largest Italian producers.

The Ligurian mines, above Genoa, lie near the Mediterranean coast, the ore bodies occuring in stratified Azoic rocks, as contact veins between diorite or serpentine and the metamorphic rocks, the ores being mainly sulphide, with quartzose gangue.

The ore of the Volterrano district is mainly chalcopyrite, with a small quantity of chalcocite found in fissures in a red gabbro, known locally as porfido rosso. This district has been the scene of copper mining operations from very early times.

In the Piedmont district mines were worked in Roman days, and traces of old workings are to be seen at many points. The ores occur in stratified archaic rocks, no fissure veins being found, and nickel and cobalt frequently are associated with copper.

In the island of Sardinia there are copper deposits near Freigas, on Monte Tramento, in a bed of clay-slate alternating with limonite schist, the copper ores occuring near the contact and showing considerable chrysocolla above, with chalcopyrite below. There are minor copper deposits, mainly in small bodies and of low grade, at several other points in Sardinia. In 1905 the production of Sardinia was 98 metric tons of copper ore, all from the province of Cagliari.

LUXEMBURG. There is a small copper mine at Stolzenburg, near Diekirch, opened 1896. The vein averages about 20 inches in width and carries ore of good copper tenor.

NORWAY. The copper mining industry of Norway is of considerable antiquity, and in 1799 Norway produced 480 tons of fine copper, mainly from the Röros mines of Trondhjem, and one hundred years later the output was 3,935 long tons of fine copper, Norway being one of the few European countries to increase its copper output during the Nineteenth Century. Most of the Norwegian mines are opened on lenses of cupriferous pyrite, some of these lenticular masses being of large size. As a rule the lenses have a nearly vertical dip, but are deep rather than wide, being comparable in shape to eggs on end, rather than to the ordinary lenses having their greatest length along their axes of strike.

There are copper mines in the provinces of Christiania, Christiansand, Trondhjem and Tromsö. The principal mine of the present day is the Sulitjelma, in the amt of Nordland, stift of Tromsö, north of the Arctic circle. The country rock is mica-schist, of lower Silurian age, with eruptive greenstone flows conformable with the schist, the ore bodies occurring as extended lenses, very persistent in strike and dip, on the contact of the schist with metamorphosed amphibolite and olivenite gabbro, the ore being exclusively cupriferous pyrite, averaging 2.25 per cent. copper, with small quantities of nickel and silver, and of good sulphur tenor.

In the stift of Trondhjem are the Röros and Meraker districts, the oldest copper fields of Norway, and among the oldest in northern Europe, which

remain producers of some present importance. In these districts the ores occur as sulphides, in schist and slates of lower Silurian age.

In Telemarken, Christiansand, there are a number of old mines carrying numerous veins of sulphide ore, mainly of narrow width but great persistence.

PORTUGAL. The important copper mines of Portugal are all in the province of Alemtejo, near the border line of the Spanish province of Huelva, but there are a few small properties in the southern province of Algarve, next south of Alemtejo. As the mines of Alemtejo are opened on the western extension of the Sierra Morena, their geology is practically the same as that of Huelva, described in the article on Spain. The principal Portuguese mines are in the districts of San Domingos, Grandola and Aljustrel, production averaging about 500,000 long tons of cupriferous pyrite annually.

ROUMANIA. There are no large copper mines in this kingdom, the principal producers, all very small, being in the Mehedintze district. In the Carpathian Mountains carbonate ores and chalcopyrite, slightly argentiferous, are found at Valea Choboroasa. Copper ores also exist near Salishtea and in the district of Dobroudja, at the towns of Balabancea, Islam-Geafer and Carapelit, also at Altan-Tepe, near Tcheamourli.

RUSSIA. There are extensive cupriferous districts in the Russian Empire, those of Siberia being treated separately in the chapter on copper deposits of Asia, with the exception that the Transcaucasian copper mines are included in this article on Russia, as also are the copper measures on the eastern slope of the Ural Mountains, that lie in the governments of Perm and Orenburg, each of these divisions lying partly in Europe and partly in Asia.

There are copper mines in the governments of Perm, Orenburg, Ufa and Samara along the Ural Mountains, and in the governments of Viatka and Kasan, next west. In Transcaucasia there are mines in the governments of Elizabethpol, Kutais and Tiflis. In the Russian Empire there are a considerable number of copper mines and nearly or quite 30 smelting plants, mainly small and antiquated in design, though a few properties, notably the Kiadebek, have modern reduction works. The comparatively small output of Russian copper is no criterion of the possibilities of production inherent in the copper measures of this, the greatest empire in existence, and there are various fields of much promise awaiting extensive exploitation at some future time.

The Permian formation, taking its name from the government of Perm, is very extensive, being found in the governments of Perm and Orenburg, on both sides of the Urals, and in the adjoining governments of Ufa, Samara, Kasan and Viatka. The mines of these governments are opened in Permian and Triassic formations, the ores occurring oxidized, and of low average tenor, not to exceed 2 to 3 per cent., but with occasional enrichments, notably as massive malachite, of excellent average tenor. The bedded deposits of the western slope of the Urals are mainly of Permian age, with some cupriferous strata of Triassic age. Among the Permian mines of interest is the Miednoroudiansk, where a single body of massive malachite weighing 339 tons was extracted in 1836. At depth the pockets of carbonate and oxide ores pass into chalcopyrite and cupriferous pyrite.

The Transcaucasian mines, in the three governments of Elizabethpol, Tiflis and Kutais, furnish about half the copper production of the empire. In the Kedabenski district of Elizabethpol, ore occurs as irregular lenses, often of large size, in veins with quartz-porphyry gangue, with walls of diorite and diabase porphyrite, the lenses shading gradually into the country rocks. The ore is a mixture of slightly auriferous and argentiferous covellite and chalcopyrite, carrying sphalerite and occasional galena, associated with pyrite and pyrrhotite, with a heavy barite gangue.

Copper ores were worked in a small way, toward the end of the Eighteenth Century, near Kielce, in Russian Poland, and were reopened for a short time in 1904. There also are old copper mines at Chenciny, Poland, carrying mainly carbonate ores, on which some efforts at mining have been made since the beginning of the Twentieth Century.

SCOTLAND. There are old copper mines, which never were of importance, in Renfrewshire and Rosshire, with deposits of chalcopyrite, apparently of some promise, in Perthshire, and occurrences of copper ores are noted in Kirkcudbrightshire.

SERVIA. There has been a small but fairly continuous copper industry in Servia for some hundreds of years, and it is possible that copper mines were operated by the Romans. The production of fine copper by Servian mines in 1900 was 270 metric tons.

The principal producing copper field is in the vicinity of Majdenpek, and in the adjoining districts of Rebelj and Wis, in northwestern Servia, in the basin of of the Yablonica river, the copper belt running for about 15 miles northwest and southeast along the northern slope of the Povljen Mountains. The Rebelj deposits occur in serpentine, with intercalated argillaceous limestone, in lenses up to 100 feet in length, carrying a core of crystalline pyrite with disseminated chalcopyrite averaging about 5 per cent. copper, with the outer shell of the lense carrying ore up to 15 per cent. in copper tenor. There also are deposits of copper ore at Radanovci, Stanmareta and Wuinovatz.

SPAIN. Of all the producing copper fields of the present age, the Hispano-Portuguese cupriferous measures of the provinces of Huelva and Sevilla in Spain, and the provinces of Alemtejo and Algarve in Portugal, are the most ancient. The first copper mining on the Iberian peninsula was done, in all likelihood, by the Phœnicians, some three thousand years ago, and was continued by their kindred, the Carthaginians. Upon the destruction of Carthage by the Romans, that people succeeded to the dominion of the peninsula, and extensive traces of their work remain observable to this day in the copper mines of the Sierra Morena. Mine timbers, in all likelihood set by Roman workmen nearly or quite two thousand years ago, remain in place, effectually protected from the gnawing tooth of time by the preserving action of copper sulphate, with which the mine waters are strongly charged. Upon the disruption of the Roman Empire, Spain and Portugal fell to the lot of the Visigoths, and, a few centuries later, the Moors conquered the southern half of the peninsula, remaining in possession for some seven centuries, and operating the Huelvan copper mines to some extent. Upon the expusion of the Moors by Ferdinand and Isabella, late in the Fifteenth Century, the Spanish gained possession of the

rich mines of the Sierra Morena, and the larger of these old properties were worked, in a spasmodic way, with frequent hiatuses, until 1860, when the Tharsis mine—supposedly the Tarshish of the ancients—was reopened, and worked along modern lines. The Rio Tinto, much the greatest of Spanish mines, and one of the four greatest copper mines in the world, passed into the hands of the present owners in 1873, and was reopened in 1876. Further particulars of interest in this connection will be found in the article descriptive of the Rio Tinto mine.

Spain ranks third among the copper producing countries of the world, and was second only to the United States as recently as 1902, having been passed by Mexico in 1903. As recently as the early years of the ninth decade of the Nineteenth Century, the production of copper by Spain, Chile and the United States was practically on a parity. There is no other copper field in the world that has been worked, practically continuously, for three thousand years, notwithstanding which the outlook for the Spanish copper mining industry is excellent.

In the kingdom of Spain there are copper mines of more or less importance in the provinces of Almería, Asturias, Barcelona, Burgos, Cuidad Real, Córdoba, Coruña, Gerona, Granada, Huelva, Huesca, Jaen, León, Madrid, Menorca, Navarra, Palencia, Santander, Sevilla, Teruel and Zaragoza.

In 1901 the official Spanish returns gave 271 productive copper mines in the province of Huelva, but in many cases these counted separately numerous mine openings held by a single company, hence the number of actual producers was much smaller, including only about a dozen with outputs of importance. The active portion of Huelvan cupriferous belt is a zone of about 15 miles average width, with an extreme length of about 80 miles, running practically east and west through the entire province of Huelva, with its eastern end in the province of Sevilla and its western extension in the provinces of Alemtejo and Algarve in the kingdom of Portugal. This district lies along the Sierra Morena, and, in addition to the dimensions before given, which are those of the fairly proven copper territory, there are indications of copper, of more or less promise, is a district of about 30 miles extreme width by 125 miles or more in length, along this range of mountains and beyond its limits. The Sierra Morena, or Andevallo, cupriferous belt, is divided into four zones, the eastern, known as the Cerro Muriano, including various mines near the city of Sevilla, while the western zone lies in Portugal, with the village of Grandola as an approximate center. The northern zone includes the principal mines of Huelva and Alemtejo, while the southern zone includes a number of mines of considerable importance, the largest being the Tharsis. All of these zones present the same general characteristics, carrying lenticular masses of ore, usually at the junction of slates of the lower Carboniferous system with intrusive syenite and diabase. The ore bodies lie parallel with the slate, with northwesterly strike, and dip to the north. The slates are of a yellowish cast at surface, where weathered, but are bluish at slight depth. Apparently the ore bodies, while occurring as immense lenses, may be considered true contact veins. The deposits are of varying size, sometimes of immense proportions, the largest, owned by the Rio Tinto, reaching a length of nearly 4,000 feet, with an extreme width of 500 feet. The ore bodies have, or once had, iron cappings, and the richer ores above ranged about

5 per cent. in copper tenor, being succeeded, at a depth of about 200 feet, by a sulphide zone carrying an intimate mixture of chalcocite and pyrite, with values averaging 3 to 4 per cent. in copper, with some ore of high grade. The decrease in values is fairly steady from the top of the deposits below the altered zone, and at a depth of about 500 feet values range only about 1.5 to 2 per cent. copper, and at still greater depth the copper tenor declines to about one per cent. with indications that the bottom of the immense lenses will carry less than one per cent. copper, though probably they will remain workable, owing to the sulphur values in the pyrite. All ores are slightly argentiferous and auriferous, the precious metals being extracted closely, and while the amount per ton in gold and silver is very small, the aggregate values so saved are very great, owing to the immense tonnage of ore that is treated.

The mines of Sevilla probably rank next to those of Huelva in present importance and future promise, though the production is trivial as compared with the immense Huelvan output. In 1903 there were 23 productive copper mines in Sevilla, which yielded only 2,204 metric tons of copper ore but production has increased largely since.

In 1902 the province of Gerona had 25 mines of copper and 4 mines carrying copper in connection with other metals, all of which were idle.

In the Guadix district, about 15 miles from the city of Granada, in the province of that name, rich copper sulphides are found in a bed of marl, on which some mining has been done.

The province of Huesca has old copper mines and other mines carrying considerable copper values, but copper mining is practically non-existent.

In 1902 there were 41 copper mines, all idle, in the province of Lerida.

The northern part of the island of Menorca shows a copper belt of 16 to 18 miles length, with ore occurring in a bed of marl of one to two feet thickness, lying in clay-shales and sandstones of the lower Triassic system. The Puebla mine shows ore under peculiar circumstances, mainly as chalcocite and chalcopyrite in connection with lignite, the conclusion being inevitable that the copper values were precipitated by the carbonaceous material.

There are copper deposits and attempts at copper mines in the province of Teruel, and the same may be said of the province of Zaragosa. There also are old mines of small importance, now idle, in a considerable number of other Spanish provinces.

SWEDEN. The famous copper mines of Falun have been producing copper for more than 600 years. Copper mines are found in the läns of Dalarne, Östergothland, Kopparberg, Malmöhus, Norbotten, Orebro and Vestmanland. The copper production of Sweden was about 850 long tons in 1799, and 100 years later was only about one-half as much.

The famous mines of Falun are worked by what probably is the oldest stock company now existing, its charter dating from A. D. 1288. The Stora Kopparberg is the best known mine of the district, and furnishes much of the copper and practically all of the gold produced in Sweden. The ore deposits resemble those of the Rio Tinto, and carry 2 to 3 grams gold per ton, occasionally with much higher gold values. The ore is chalcopyrite, disseminated in pyrite, and is divided, as mined, into two classes, known respectively as hard pyrites, carrying about 3.5 per cent. copper, and soft

pyrites, carrying about one per cent. copper only. Th
of considerable importance in these ores.

SWITZERLAND. Copper ores, mainly bornite, c
erate stratum of Permian age near Murtschenalpe, in t
but apparently no mining ever has been attempted.

TURKEY. Extensive copper deposits are noted
the Balkan Mountains. The present copper production
pire, including holdings in both Europe and Asia, prob
metric tons yearly, with exports of 1,000 to 2,000 tons,
and production being in Asiatic Turkey. In Europea
copper mines along the southern part, and there is
Yardimli, in the Rhodope Mountains. Copper mine
crown are found in the island of Thasos, and an island
mora shows copper sulphides, with evidences of exte
tions in the past.

WALES. The copper mines of Anglesea were wor
and possibly by the Phoenicians before them. Up to
was a considerable producer, and, in 1799, made about 1,
copper, rendering this the second copper producing di
but in 1899 the production was only 49 tons, nearl
leaching the mine-waters from old properties.

The Mona and Parys mines of Anglesea, among t
the world, show sulphide ores with quartz gangue in
to 60 feet width, between Silurian slate and felsite, c
as impregnations in felsite.

In addition to the mines of Anglesea there are old
idle, in the counties of Caernarvon, Cardigan and Meri

bokfontein, in the Concordia district, as early as A. D. 1685, and these attempts were repeated in 1799, but the first shipment, of eleven tons of ore, was not made until August 31, 1852, since which time production has been continuous. The ore occurs in lenses, often of great size, in granitic rocks. The predominant rocks are gneiss and schist, with a generally east and west trend, and flat dip to the north, traversed by series of fractures, with diorite dykes, in which occur lenses of sulphide ore, mainly chalcopyrite, but with an appreciable percentage of bornite, with dioritic gangue. The principal ore bodies occur at or near the point of intersection of the diorite dykes with barren fissures. The ores range from 7 to 21 per cent. in copper tenor, after careful selection.

CONGO FREE STATE. The principal copper deposits of Congo Free State, as now known, are in Katanga, the southeastern province, around the headwaters of the principal affluents of the Congo river. Principal mining operations of the present are between the Lualaba and Lufira rivers, where a considerable area shows oxidized and sulphide ores, occurring in blanket veins, impregnations and stockwerks, mainly in talcose and siliceous schists. These ore bodies are of unusual size, and are said to be of unusual richness, averaging 15 per cent. copper, but apparently this reference is to the enriched ores of the upper workings, and such values are not likely to hold to great depth. There are considerable remains of native workings, and a limited production is secured by natives. More than eighty old workings are shown in one district, where the oxidized ores are smelted in pits, with charcoal, and the product is used for ornaments, buttons and various utensils. This district is of considerable promise.

EGYPT. There are copper deposits in the Nubian region of the Upper Nile, but no attempts at serious mining have been made in historic times.

FRENCH CONGO. Malachite and chalcocite have been found in place in Triassic sandstone, in the Crystal Mountain range, near the coast of Gaboon. Near Comba, between Brazzaville and Loudima, along the line of the Congo Free State, there is a cupriferous district in the Kouilou-Niari basin, ore occurring in cupriferous sandstone above limestone. These deposits have been worked by natives in a primitive way, for centuries, and a considerable trade once existed in copper manufactured from these mines, but this became extinct with French occupation. The native workings are pits and trenches not exceeding about 35 feet in depth, and show azurite, malachite, chalcocite and tetrahedrite. The deposits apparently are of low average tenor, but cover a considerable area. This district has been but slightly explored by Europeans, though some work has been done at the Mindouli mine, which seems the principal deposit. The district is about 300 kilometers from the coast, and probably copper mines would not be workable without railroad transportation, now lacking.

GERMAN EAST AFRICA. Copper ores exist at various points in this protectorate, but no mines have been developed.

GERMAN SOUTHWEST AFRICA. This protectorate has copper deposits in Damaraland, Ovamboland and Hereroland, the latter containing the notable Otavi mines. The copper mines of the Otavi Mountains were worked to slight depth, in a primitive manner, by the natives, apparently for some hundreds of years. A great block fault, in limestone, traversed

by numerous cross-faults, producing diverse deposits, shows ore occurring mainly in sandstone, laid down in sink-holes. This district includes Otavi, on the southern side of the range, and Tsumeb on the northern side. The mine shows native workings, deepest about 35 feet only, over an area of about 200 by 500 feet, with irregular fault veins, carrying mainly chalcocite, with occasional malachite, associated with galena, in masses ranging from microscopic size to two tons in weight, with sandstone gangue, and impregnations in both walls.

In Damaraland there is copper in the Rehoboth district and on Gross and Kleinen Spitzkopf, 20 kilometers northeast of Rehoboth. The ores, as developed, are mainly malachite and chalcocite, with quartz gangue. From the Otyizongati district, about 40 miles east of Okahandja, 100 tons of carefully selected ore sent to Germany in 1904 gave returns of 28.5 per cent. copper.

LIBERIA. Copper ore is said to exist in the interior of this country, but the extremely dense forest growth operates to prevent the acquisition of definite knowledge. Copper has been used to a limited extent, in the making of weapons, by the Mandingoes, a tribe in the far interior. The law prohibits the holding of land by other than Liberian citizens, and until this law is repealed, modified or evaded, there can be no copper production of importance from Liberia.

MADAGASCAR. Copper ores have been smelted by natives, in a primitive way, and to a limited extent, for generations. There are small native mines at Ambataofaugehana in the district of Ambositra, and at Vohinana. The ore is mainly malachite, surface workings giving returns of 10 to 45 per cent. copper. Ore is reported to occur in mica schists, and the mines are said to be nearly worked out. Native mines are reported also from the Betafo country, and in the district of Imerinarive. In the Cercle de Tsiafahy native copper has been found, and virgin metal is reported also from the district of Vonizongo. Rich ores are said to exist near Lake Kinkony, in the Cercle de Mahavavy, and traces of copper are reported from the province of Vohemar.

MOROCCO. Copper ores exist at a number of points in this country, and about 1860 were mined and smelted, in a small way, near Tarudant, capital of the province of Sus. There are occurrences of copper ore near Tangier, also at Tablah, near Mequinez, and at Mesfiwa, in the vicinity of Mogador.

NATAL. There are a number of known occurrences of copper ore in Natal, but the colony lacks producing mines. In Zululand sulphide and silicate copper ores are noted near the Insuzi and Umhlatuzi rivers, in the N'kandhla district, but these lack adequate transport. A syndicate was formed, in 1905, to exploit copper deposits on the Buffels River, along the border of Natal and Zululand. Various local syndicates have done more or less exploratory work at Undweni and vicinity, near the Vryheid border, in Zululand, where a vein, said to be traceable for several miles, shows rich carbonate, silicate and sulphide ores, usually zinciferous, occurring largely as impregnations, but with erratic distribution. The Dania and Magdalen properties, in this district, show fine samples of copper ores.

PORTUGUESE EAST AFRICA. This colony has copper ores in Mozambique, Nyassaland and Zambesia, the latter district showing considerable traces of old mining operations, apparently conducted mainly for gold, but copper ore exists at numerous points, and apparently in promising quantities.

RHODESIA. There are remains of ancient mining operations, for both gold and copper, in the colony of Rhodesia, and it is evident that the ancients possessed small and crude furnaces for smelting. The mining laws of Rhodesia are very liberal, and the harnessing of the Victoria Falls of the Zambesi river should greatly stimulate mining and other industries, through furnishing the first cheap power known in Rhodesia.

Copper ores have been found at a number of points, but principal developments are in the northeastern section, in the Victoria district, mainly along the northern reaches of the Kafue river, an affluent of the Zambesi. The cupriferous zone is a limestone belt, lying approximately east and west, with a width of about six miles and length of about sixteen miles, bounded mainly by Cambrian and Silurian schists, carrying deposits with shallow surface zones of oxidized ores, succeeded at little depth by sulphides, these deposits occurring occasionally as pipe veins, and being more or less argentiferous. The Lomagunda district of Mashonaland, circa ninety miles northwest of Salisbury, shows copper impregnations in silicious and calcareous schists, ores being mainly malachite, with some chrysocolla. The Blue Jacket mine shows old workings to a depth of 100 feet, with lateral workings of 10 to 400 feet in length, on ore bodies occurring in limestone and schists. Apparently these mines were worked to the depth of the oxidized ores, the ancient miners stopping when base ores were reached. It is obvious from the depth and extent of these workings, and the remains of crude smelters, that the work was done by some race much further advanced in civilization than the present natives.

SENEGAL. The existence of copper ores has been reported from various points along the Senegal river, but no mines have been developed.

SUDAN. Prospecting has been done in various parts of the Anglo-Egyptian Sudan, but nothing of importance found, though there is believed to be copper in the Suakin district. The only producing copper mine is the Hofret-el-Nahas, in southwest Kordofan, where mining and smelting are conducted on a primitive scale, to secure copper used for purely local consumption.

TRANSVAAL. Apparently copper was worked to some extent by the ancients, and there are numerous remains of prehistoric diggings, especially near the Messina mines, in the Zoutpansberg district of northern Transvaal. There has been considerable activity in copper development, and even greater activity in the formation of small local mining syndicates, since 1905. Copper ores occur in the districts of Lydenburg, Middelburg, Potchefstroom, Pretoria, Rustenburg, Waterburg, Zeerust and Zoutpansberg.

The most promising copper developments are noted at the Messina mines, near the Limpopo river, in the Zoutpansberg district, and there are numerous smaller developments, on which a little work has been done, in this district. Work is under way at Barberton and vicinity, in the Middel-

burg district, and there is a copper belt, on which a number of explorations are being made, near the Olifants River, about 45 miles northeast of Pretoria. Some of the copper prospects of the Transvaal are of promise.

TUNIS. Copper ore exists at various points in Tunis, occurring mainly as oxidized ores in small bodies, and tetrahedrite, frequently rich in silver, these ores being found mainly in limestone, with ochrous iron gangue. Mines have been worked at Chouichia for some time, the production, which is small, being shipped to Europe, as a matte of 35 to 50 per cent. copper tenor. On the little island of Galita, off the northern coast of Tunis, a small mine has been opened on a vein of about 3 feet width, traversing diorite. The ore is mainly chalcopyrite, averaging about 3 per cent. copper and the vein is traceable for several hundred meters. There are several parallel veins, one of which, slightly developed, shows carbonate ores giving average assays of about 12 per cent. copper.

UGANDA. The British protectorate of Uganda, in Central Africa, near Lake Tanganyika, has copper ores in the Central Province, but apparently no serious attempt has been made at development, transportation facilities being poor.

CHAPTER XXI.

Copper Deposits of Asia.

The copper deposits of Asia are treated herein, by countries, in alphabetical order, as in the preceding chapters.

AFGHANISTAN. The northern part of Afghanistan is said to be rich in copper, and in this section there are small local mines, worked by old methods for some centuries. The copper deposits are considered valuable, but the government refuses to grant either railroad or mining concessions to foreigners, and will not allow a white man to take up permanent residence in the country, hence until the present policy is changed there can be no copper developments of importance.

ANNAM. Copper ores are known to occur at various points in the province of Quang-Nam, but nothing has been done in the way of modern mining.

ARABIA. The ancient Egyptians mined both copper and turquoise at Maghara, in the Sinaï Peninsula, and it is evident, from old inscriptions, that copper was smelted at that point in both the Fourth and Twelfth Dynasties. These mines evidently never were rich in metal, but probably were among the very first copper mines ever opened, and the date of the first mining probably is as remote as 5000 B. C. These mines were the cause of various wars between the races coveting them, but were held mainly by the Egyptians, for several thousands of years. It seems probable that after being worked, more or less steadily, for about three thousand years, they were abandoned finally, before Moses led the children of Israel out of Egypt, and about a thousand years before the opening of the Rio Tinto mine which occurred circa 1,000 B. C. An attempt at reopening some of these ancient mines was made, early in the Twentieth Century, after about four thousand years of idleness. The ore is mainly chrysocolla, associated with turquoise, in porphyry, and there are remains of ancient furnaces and old slag-piles near the adits. Analyses of the slags do not show the use of fluxes in the reduction of the ores, and it is probable that they were smelted with charcoal, in small brick kilns. There are deposits of copper ore at other points in Arabia Petrea, lying along the shores of the Red Sea.

BURMAH. The discovery of a body of promising copper ore was reported from Mimbu, in 1906, and several copper mines are being opened in the Upper Shan states.

CHINA. Copper ores occur in more or less profusion at a considerable number of points in the vast Chinese empire, and copper mines have been worked in several provinces, notably in Yun-Nan, certainly for many centuries, and probably for several thousand years, remaining active to this day, the ores being mined and smelted in a primitive manner. The production of the empire is estimated at five million pounds yearly, all of which is required for domestic consumption, in addition to heavy imports.

Owing to the existence of vast coal measures of prime quality, and a large and steady supply of efficient and tractable labor, the development of copper mining and smelting, when once begun in earnest, along modern lines, should be rapid, and China should become, during the second or third decade of the Twentieth Century, an important producer of the metal.

A few mines, operated in a primitive manner, with correspondingly small production, are found at San-Kia-Tschang, in the province of Ho-Nan.

In the province of Hupeh, near Ichang, there are large beds of cupriferous shale, containing disseminated ores of low average tenor.

There are deposits of copper ore at various points in the province of Kwang-Si, with a few small mines developed along primitive lines.

There are copper mines in the province of Kwei-Chau, in southern China, of considerable antiquity, as evidenced by extensive slags resulting from old smelting operations. The ore bodies of Kwei-Chau resemble those of Yun-Nan.

The mountains of Manchuria contain promising deposits of copper, at several points, and some of these have been worked by natives, in a small way, along very crude lines. The most modern mining and smelting plant in the Chinese empire is found near Kaya, this having been installed early in the Twentieth Century.

Copper deposits and small copper mines are found at several points in the province of Shan-Tung, and this province is believed to be rich in minerals.

A limited copper production is secured from a few small and ancient mines in the province of Sze-Chuan, where the metal is extracted mainly from low grade cupriferous sandstones.

The province of Yun-Nan has the principal copper mines of China, and furnishes the moiety of Chinese copper production, the annual ouput of the mines of Yun-Nan being estimated at one to two thousand tons of fine copper. The copper mines of northeastern Yun-Nan have been exploited for many centuries, and in the aggregate their production is by no means trivial. The ores are mainly sulphide, and are slightly auriferous and argentiferous. The principal centre of copper mining and smelting is at Tung-Chau.

FEDERATED MALAY STATES. In this British protectorate there are copper deposits, some apparently of promise, at several points, but these remain undeveloped, mining efforts having been centered upon tin.

FORMOSA. Copper ores exist at various points on this island, now held by Japan. In the Kinkwaseki gold mines, in the Keelung district, copper ores have been discovered, and their exploitation was begun in 1906.

INDIA. The beginnings of the copper industry of India antedate reliable historical records, but it is known that copper ores have been mined and smelted for a score or more of centuries. India was a considerable producer of copper during the middle ages, and up to about the middle of the Eighteenth Century, after which the output fell off slowly, and has dwindled to merely trivial figures. During the first half of the Eighteenth Century India shipped large quantities of copper to Europe, but in the latter half of that century the current was reversed, and the Indian imports of

copper for 1901 were 7,998 long tons, and at present must range in the neighborhood of 10,000 long tons yearly.

In Bengal there are old copper mines at various points. The last active mining was done from 1887 to 1891, at Baragunda, Hazaribagh, but proved unprofitable, all ore being carted 24 miles to a smelter at Giridhi. The ore occurs as chalcopyrite running 1 to 3 per cent. copper, with gangue of country rock, in mica schist. A single small pocket of ore discovered in the Singhboon district produced a small quantity of 13.5 per cent. ore in 1892, but additional pockets were not found. The Chota Nagpur mines, approximately 150 miles from Calcutta, are in about the center of a cupriferous belt of about 75 miles length, showing numerous old workings, and paralleled by a railway. The extensive remains of former work evidence considerable activity, and a respectable production, at some time in the past.

Copper ore exists at various points in the Central Provinces, and a mine is being developed near Sleeminabad, 40 miles from Jubbulpore, in a formation of Silurian age showing dolomite, slate, quartzite and mica schist, folded and metamorphosed, with numerous porphyritic dykes, ore occurring in the stratified rocks near the intrusive porphyries. The veins, having well defined walls and average width of about 6 feet, have been traced by outcrops for nearly two miles. The ores are auriferous and argentiferous malachite and argentiferous tetrahedrite, giving assays up to 25 per cent. copper, 197 oz. silver and 15 dwts. gold per long ton. In 1901 twenty-five long tons of ore were mined in Rajputana, where chalcopyrite occurs disseminated through black Paleozoic slates. These deposits have been worked in a very small way for centuries.

In the Northwest Provinces copper ores of some promise are found in the Kumaon division, lying in the Himalayan region between Nepal and the Punjab, the Rai mine being the principal property. The ores of the Rai district occur in fissure veins showing gossan cappings, with the usual oxidized and sulphide ores, with quartz gangue, and occur at times as impregnations. Labor is plentiful, cheap and poor, and transportation facilities are inadequate, but the district is considered of some promise. In the division of Garhwal considerable copper mining has been done in the past, at Dhanpur and elsewhere. The Dhanpur deposits occur as bornite and chalcopyrite, in the joints of calcareous clay-slates, and in silicious limestone, near igneous intrusives, the workable deposits occurring at the intersections of vertical and horizontal bedding and jointing planes, with quartz gangue.

At El Agur there is a stockwerk in quartzite, carrying carbonate ores, chalcopyrite and tetrahedrite, of an estimated average copper tenor of about 5 per cent., the zone being traceable for nearly fifty miles, and being worthy of careful study when adequate transportation facilities are furnished. Small pockets of rich ore have been found at various other points, but the uncertainty of these has not permitted continuously profitable mining.

JAPAN. Copper was discovered in Japan about the beginning of the Seventh Century, and until well toward the close of the Nineteenth Century, mining and smelting were done along primitive lines, the ore being reduced in clay pits, with charcoal for fuel. The first exports, other than

to China, were made in the Seventeenth Century, when the Dutch, who had a monopoly of Japanese foreign trade, exported seven hundred to twelve hundred tons of copper yearly for many years. In 1799 Japanese mines made about 2,800 long tons of fine copper, and in 1899 produced 27,560 tons, a tenfold increase, and the early years of the Twentieth Century have seen a steady gain in production. The modernization of mining and smelting methods was begun in the ninth decade of the last century, but beginning with the tenth decade progress was rapid, and all of the principal mines of the empire now have mining and smelting equipments of a most modern sort, and are managed with as great a degree of technical skill as can be found in any mining field of the world. Several of the largest copper mining companies of Japan have made a regular practice, for ten years or more, of sending their chiefs of departments around the world in search of information, and the benefits of such an unsually wide-awake policy are reflected in the increased outputs and greater profits of the best Japanese copper mines. Foreigners or foreign corporations cannot hold title to Japanese mines, but foreigners can become interested, as partners, with Japanese subjects, in mining properties. The mining industry, however, to all practical purposes, is exclusively in the hands of the Japanese, and likely to remain so.

Copper is much the most important metallic resource of Japan, and this country now holds fourth place among the copper producing countries of the world. The local consumption was about three thousand tons in 1899, and probably was about seven thousand long tons in 1906. Fully three-fourths of the copper produced is exported, this forming an important commercial resource of the empire.

Copper ores are widely spread, occurring on all of the principal islands, and showing nearly every variety of type. There are copper mines of importance in the provinces of Awa, Bingo, Bitchu, Bizen, Hida, Higo, Hyuga, Iwami, Iyo, Izumo, Kaga, Mimasaka, Mino, Nagato Rikuchu, Shimotsuke, Tosa, Ugo and Uzen. There are nearly two hundred copper mines, or mines in which copper is a factor of importance, of which about forty are mines making annual products of one hundred thousand to fifteen million pounds each, fifteen of the number exceeding an average annual production of one million pounds each, three of these making about half of the copper production of the empire. Ores are almost exclusively sulphides, though limited quantities of oxidized ores are noted, with occasional native copper.

The Ashio mine, in the province of Shimotsuke, is the largest copper mine of Japan. The veins are of wonderful profusion, being hundreds in number, of which about thirty are worked, these veins occurring as synclines, being opposed, in pairs, the seven main veins averaging 6 to 7 feet in width. A little melaconite and bornite are carried in the upper levels, but the principal values are in chalcopyrite, associated with galena, sphalerite, arsenopyrite and pyrite, with clay gouge and quartz gangue.

The Kosaka mine, in the province of Rikuchu, is in the extreme northern end of the main island of Japan. This was an old silver mine, supposedly exhausted, but now is the second largest copper mine of Japan, with prospects of becoming first. The ore is chalcopyrite, associated with sphalerite and pyrite, impregnating and cementing a volcanic tuff. The

ore bodies, five in number are of enormous size, the largest being 100 to 600 feet in thickness, of one-half mile known length, and proven by drill-holes to a depth of 1,700 feet.

The Besshi is a famous mine in the province of Iyo, island of Shikoku. The ore body is a vein of 4 to 30 feet width, with an average of 20 feet, developed for a length of about 6,000 feet, and occurs in alternating layers of chloritic and graphitic schist, each enveloped by a quartz schist known locally as "habu," with interstratification of piedmontite schist. Step-faults run nearly parallel, from east to west, giving throws of 10 to 20 feet, with occasional throws up to 60 feet. The ore is chalcopyrite, disseminated in pyrite, averaging about 4.5 per cent. copper.

Further details of the geography and geology of Japanese ore deposits are given in the detailed descriptions of the various mines.

KOREA. Copper ores are noted at a number of points in the northern and southern parts of the Korean peninsula, but have been found only rarely in the central part. Copper had been mined by natives for some centuries, the product being utilized in the making of household utensils. By Korean law mineral deposits are the property of the crown, hence it is altogether probable that mines will be developed mainly by the Japanese. The production of copper in 1903 was estimated at 280 tons.

The Kap San mine, in the province of Hamgyeng, is the principal property, and is under development by the Japanese firm of Mitsui & Co. Another property of some promise is the Chhyang-Uön mine, about one ri north of Chhyang-Uön, which was opened about 1885 by the Korean throne, and was transferred to Japanese control in 1893, and worked until 1905, when the rich ores were exhausted and the mine closed down. There also are old mines, opened early in the Nineteenth Century, but worked until 1904, at Hu-Chhyang and Sin-Työn.

PERSIA. The empire of Persia is known to be rich in copper, and there are small mines, many of them very old, from which copper ores are mined and smelted, in an exceedingly crude way, the small production being sufficient merely for the limited domestic demand. Until there are better transportation facilities, and foreign capital is enlisted, the copper mines of Persia are not likely to become producers of international importance.

There are primitive copper mines south of Kerman, but these lack facilities for economical transport. At Seman the deposits consist of disseminations and veinlets of oxidized ore in clay-slate, with an estimated average tenor of about 3 per cent. copper. There also are small copper mines at Sabzwar and in the Turbat district, worked on primitive lines.

SIAM. Copper ores were worked at several points by natives until the early years of the reign of the predecessor of King Chulalongkorn, but there is no present production, though copper deposits of more or less promise are found at a number of points, notably in the mountain ranges along the valley of the Menam river. Outcrops of copper ore are noted frequently along the railroad line leading to Korat, with rather extensive remains of ancient workings, where a little prospecting was done, and some ore found, by a Danish syndicate, circa 1901.

SIBERIA. The extent of Siberia is so great, the lack of transportation facilities so utter, except in a narrow stretch along the Trans-Siberian railroad, and the country is so thinly populated and so new, with the attendant lack of capital, found in all new countries, that it is scarcely to be wondered at that only a beginning has been made in the development of the undeniably extensive and valuable copper measures. The principal copper mines are found in the governments of Semipalatinsk and Akmolinsk. There are two small producers in the Russian Altai, and other small producers nearer the city of Semipalatinsk, the largest making about two million pounds of copper yearly. The output of the Altai mines, in 1903, was only 228 long tons of fine copper.

In the government of Akmolinsk, in the Kirghiz Steppe, there is one highly promising mine, known as the Spassky or Yuspenssky, where considerable production has been secured in the past, along very crude and wasteful lines. This property is now in the hands of an Anglo-French company, but is hampered by lack of rail transport. There are other properties of promise in the government of Akmolinsk.

In the government of Krasnojarsk, in central Siberia, next east of Semipalatinsk, there are copper deposits, apparently large and promising, extending from near the line of the Trans-Siberian railroad to the Altai Mountains.

There are copper deposits of uncertain size and tenor in the vicinity of the city of Tomsk, in the province of that name, lying next north of Semipalatinsk, and to the northward of the Trans-Siberian railroad.

In the Trans-Baikal province, east of Lake Baikal, there are several copper deposits said to be of considerable promise. One of these is in the basin of the Chida river, where native copper occurs in masses ranging up to several pounds in weight, in amygdaloidal melaphyrs, under conditions somewhat similar to the occurrence of native copper in the Lake Superior district.

There are copper deposits, considered promising, in the northern province of Yeniseisk, and it is probable that copper ores exist also in the province of Irkutsk, and very likely in practically all of the other Siberian provinces.

THIBET. Copper is mined and worked in a small way and a primitive manner in southeastern Thibet, but the extent and promise of the copper measures are undetermined.

TONQUIN. Copper mines are found in the provinces of Son-Tay, Lang-Son and Lao-Kay, near the frontier of the Chinese province of Yun-Nan, and, like the mines of Yun-Nan, these have been worked in a primitive way for centuries, but never have become as important as those across the Chinese border. Various concessions have been granted for the exploration of copper deposits in Tonquin, but no producing mines have resulted therefrom as yet.

TURKESTAN. There are a number of small copper mines in Turkestan, the largest being the Karankuski, near Tashkent, and since the occupation of Turkestan by Russia there has been renewed interest in mining operations. A small smelter was built in 1903, on the shore of the Syr Daria river, at the foot of the Supetau Mountains, and new copper mines

are being opened along the Syr Daria river in the Namangan and Khoka districts. There also are ores in the Ferghanah district, occurring as i pregnations in sandstone to the extent of 1 to 5 per cent. copper, with occ ional local enrichments up to 10 per cent. and as high as 40 per cent. copper tenor.

TURKEY. The principal copper mines and the most promising cop deposits of the Turkish empire occur in Asia. The best known mines a those of Arghana-Maaden, located between Diarbekir and Kharput, in t Armenian Tauros of Asia Minor. At the beginning of the century the mines were producing about 1,500 tons of fine copper yearly, export mainly to England via Alexandria. The ore is of high grade, though mi ing and smelting methods are by no means modern. Copper ores occ also in several of the cazas in the Vilayet of Cosova. There are mines importance in the vicinity of Bakir-Maaden, near Diarbekir, and forme there were mines in operation near Tokat. Copper has been produced greater or less extent by the mines of Kalabak, near Mount Ida, from ti immemorial, these having been old mines in the time of Strabo, who scribed them. The ore of the Mount Ida mines is chalcopyrite, occurri in Tertiary slates and limestones. There also are small old mines n Dendengatsch.

In the Vilayet of Trebizond, between Kerassund and the Russi frontier, along the Black Sea, there is a copper district of some promi with a number of small producers, and copper mines are said to have be worked in this district as early as the beginning of the Thirteenth Centu

CHAPTER XXII.

Copper Deposits of Australia.

The copper deposits of the Commonwealth of Australia, which includes the island of Tasmania, are treated in alphabetical order, by states, in this chapter, and those of New Zealand follow. Copper production dates from 1843, when the first shipment was made from the Kapunda mine, opened in the previous year. Production in 1906, by states, was by Tasmania, South Australia, Queensland, New South Wales and Western Australia, in the order given, Victoria not being a producer. Development has been hampered, except along the coast and in specially favored interior districts, by lack of transportation facilities, lack of water and lack of the large capital necessary to make successes of mines of low and medium grade copper ores.

NEW SOUTH WALES. Copper was the first metallic product of this state, the first mining attempts having been made in 1845, but the Great Cobar mine, opened in 1869, was the first important producer and remains much the largest mine of the state.

There are nearly 300 localities in the state where copper has been found, and in most of these mines have been opened or attempts made at mining. There are three principal copper districts, known as the Cobar, Coast and Central fields. Copper is found mainly in the counties of Bathurst, Blaxland, Canbelego, Cunningham, Mouramba, Murray and Robinson. The principal cupriferous field is in Robinson and adjoining counties, in the western districts, where copper deposits of more or less promise are shown over an area of about 400 square miles. This field includes the Cobar, Girilambone, Nymagee, Melrose, Mount Hope and smaller cupriferous districts. The formation over this entire territory is mainly Silurian slates, with few occurrences of eruptive rocks, ore bodies occurring as bedded veins in Silurian schists. The district is a desert plateau, with occasional hills and short mountain ranges. There is a cupriferous district in the central part of the state where eruptive rocks predominate, and there are a number of scattered mines along the coast. The Budgery district is one of the newest fields of promise.

QUEENSLAND. The copper deposits of Queensland probably are the most promising found in any of the Australian states, but the industry suffers, not only from the aridity of many of the principal districts, and lack of railroads in certain of the fields, but also from untoward political conditions, there being universal suffrage, with the labor element in the saddle and inclined to captious and arbitrary methods. The state was a regular though small producer of copper until the collapse of the Secretan Syndicate in 1889, after which the industry was greatly depressed until about 1898, since which year there has been marked and fairly steady progress. The older copper fields were at Peak Downs, Mount Perry and Cloncurry, native copper being mined in the last named district from amygdaloidal traps, under conditions greatly resembling those found in the Lake

Superior district. Work at this point was suspended because of lack of rail transport. There are copper mines in the counties of Beaconsfield, Bowen, Cardwell, Clermont, Cook, Gilbert, Lynd, Merivale and Palmerston, and occurrences of copper minerals at other points.

The Herberton district is the third largest producer of the state and includes the Chillagoe sub-district. This is a field of considerable promise, and was the largest copper producer of the state previous to the development of the copper measures of the Mount Morgan field. The Chillagoe district covers about ninety square miles, with smaller subsidiary districts adjoining. Copper and lead occur in conjunction with garnet and wollastonite, usually at or near the point of contact of Carboniferous limestone with granite-porphyry, the latter being much decomposed. The ore bodies vary greatly as to size and dip, ore occurring mainly as irregular segregations and being very bunchy. The existence of ore deposits without regular walls is a feature typical of this field. The surface ores as a rule are decidedly rich.

The Mount Perry district, in Bowen county, near the coast of southern Queensland, is a field of considerable importance. The predominant rock form is granite, and the fissure veins therein are mineralized only for portions of their width, the rich paystreaks averaging under one foot as a rule. Ore values have disappeared with depth in some cases, but in others have held to at least 800 feet. The ores are highly silicious and the gossans are both auriferous and argentiferous as a rule.

The change at depth of the Mount Morgan mine, in the Mount Morgan field, from a big gold mine to a big copper mine, is referred to in detail in the description of that mine.

The Stanthorpe field is an old district of considerable promise, but is now a small producer only.

The Tenningering district is fourth in the state in point of production, and has several properties of promise.

The Glassford Creek district is a new and promising field, with active development work under way at several properties.

The Cloncurry field, in northern Queensland, shows copper deposits at various points over a district about 75 miles from east to west and about 150 miles from north to south, the center of this district lying about 150 miles south of the Gulf of Carpentaria. The climate is hot and wood supply inadequate, with shortage of water at some points. Ore bodies are numerous and rich, but narrow, though showing good outcrops, and are said by Thos. Gibb to present the appearance of bedded deposits rather than of fissure veins. There also are occasional veins of greater width, but not outcropping so prominently, these carrying a gangue of kaolin, and the slate walls are impregnated with pyritic ore. Indications point to deposits of low grade sulphides at depth, and some of the oxidized ores are considered amenable to cheap leaching processes. Mining and smelting have been hampered by lack of cheap transportation, but a railroad to connect Cloncurry with the port of Townsville, to be in operation about 1908, should greatly stimulate mining and smelting developments.

SOUTH AUSTRALIA. The Kapunda mine was found in 1842, a decade before the discovery of gold, and in 1845 the Burra Burra mine began production, since which time South Australia has been a regular

producer of copper to some extent. The first smelter was built in 1851 at Port Adelaide, and the second at Wallaroo in 1861. There are about 500 mines, or attempts at mines, in South Australia, of which about 25 have been developed to an important extent. The principal mines are in the counties of Adelaide, Burra and Daly, with other mines of less importance in the counties of Flinders, Light and Robe, and in the Northern Territories.

The Wallaroo and Moonta mines, in Daly county, on the Yorke Peninsula, much the most important producers of the state, are old mines, dating from 1863. The country rock is porphyritic and ores are mainly sulphide, though the usual oxidized ores, including a considerable percentage of atacamite, occur in the upper workings, with a barren zone of 50 to 125 feet between the oxidized ores and chalcopyrite.

In the Kapunda district, about 50 miles north of Adelaide, where the first copper discoveries were made, the ores are mainly oxides and carbonates, with an appreciable amount of native copper. In the Burra Burra district, about 125 miles northeast of Adelaide, the predominant rocks are limestone and shale, carrying very irregular deposits of secondary ore, with increased regularity in vein formation noted at considerable depth. The promise offered by various cupriferous fields of this state would seem to justify a much larger copper production than has been secured as yet.

TASMANIA. Copper production on an important scale dates from the opening of the Mount Lyell mine, in 1896, and this remains the only important producer of the state. All of the copper fields under exploration or now producing are in the northwestern corner of the island, in the counties of Montagu, Russell and Wellington.

The Mount Lyell district, in Montagu county, is the only developed field of the state. Rainfall is heavy and the topography of the district is rugged. The principal ore bodies now exploited occur as mammoth lenses of pyritic ore, mainly chalcopyrite, with occasional bornite, disseminated through pyrite, occurring in conglomerate and quartzite, associated with mica schist. A limited amount of chalcocite, and a little native copper, are shown at some properties, but the production is almost exclusively from low-grade disseminated sulphide ores, though one mine is working on native copper.

Considerable prospecting has been done on Mount Darwin and Mount Jukes, adjoining peaks known as the Darwin and Jukes field. In the North Dundas field some prospecting has been done, and considerable ore shown; this being mainly of low grade.

VICTORIA. The principal copper field of this state, so far as can be judged from the very limited amount of work done, is the Beechworth district, where outcrops of ore have been noted at a number of points in an area of about 50 square miles. Total production of copper ore from all the mines of Victoria, to the end of 1905, was only 17,470 long tons, valued at £206,895. Prospecting was resumed, on a small scale, in 1907.

WESTERN AUSTRALIA. Copper ore was discovered in the Northampton district as early as 1842, and the first production was secured in 1855, but no large copper industry has been built up, though a number of small mines, near the coast, were worked in the eighth and ninth decades of the Nineteenth Century. Production has been secured mainly from selected ores, gained by hand-dressing, shipped to distant smelters for

reduction, and, of course, only high grade ores can afford a profit under such circumstances. Production in 1906 was 7,430 long tons of ore, valued at £50,337, and 296 men were employed in the industry that year. A copper smelter erected by the state has been sold to a private company, with the proviso that custom smelting be done for all comers at reasonable rates, and it is possible that the building of this smelter may mark the beginning of a substantial industry, as Western Australia is by no means devoid of copper deposits of promise. The principal copper fields of the state are in the districts of Ashburton, Champion Bay, Mount Margaret, Mount Morgans, Murchison, Northampton, Phillips River and Pilbarra.

The Mount Margaret goldfield of the Mount Morgans district is much the largest producer, having mined 4,361 long tons of ore, valued at £21,934 in 1906, and the smelter now in operation in this district should stimulate development and production.

The Murchison goldfield has several properties of promise, but the production of 1906 was only 133 long tons of ore.

The Phillips River goldfield, in the extreme southern part of the state, was the only copper producer in 1905, and in 1906 shipped 2,885 long tons of selected ore. The principal ores of this district, as mined, are malachite and chalcocite, giving average assays of 31.48 per cent. copper, 2.16 oz. silver and 0.15 oz. gold per long ton.

The Pilbarra goldfield has copper ore deposits of promise, but these have been idle for several years. In the West Pilbarra district the ore occurs in bodies of considerable size, as oxides and carbonates of high grade, in schistose slate adjoining an igneous intrusive.

NEW ZEALAND. Copper was discovered in 1842 on Kawau Island, and copper mines were opened and worked on Kawau and Great Barrier Islands, circa 1865. A copper property at Nelson, opened about 1880, had a smelter, but none of these mines were successful. Ore has been found at Omaunu, in Whangaroa county. The production of copper ore from 1853 to 1904, inclusive, was valued at £18,211. One copper property was under development at last accounts.

CHAPTER XXIII.

Copper Deposits of Oceanica.

The copper deposits of this grand division are treated under the names of the various islands in which they occur, in alphabetical order, no attempt being made to group the holdings of the various great powers.

BORNEO. Copper ores and other minerals are noted at several points in the northern part of the island, but these remain undeveloped.

CELEBES. A Dutch company has done some development work in the Pagoeat district, south of Palehleh, in the northern part of the island, where the ore occurs as sulphide impregnations in slate. In the same general district, about ten miles west of Somalata, on Demerki Bay, a brecciated vein carries about 20 per cent. of slightly auriferous and argentiferous sulphides in the form of chalcopyrite, sphalerite, galena and pyrite.

JAVA. Pospecting work during 1903, in the Poelonz district, near Soerabaia, exposed a large mineral body carrying fair values in auriferous and argentiferous chalcopyrite, sphalerite and galena. The vein is about two meters in average width, opened by several shallow shafts and 223 meters of tunnels, the ores shown assaying from 0.9 to 5.25 per cent. in copper tenor.

In the Gunong Kendeng district there are springs carrying copper iodides in solution, and from these thermal waters crude iodide of copper is secured by evaporation, the production amounting to 2,346 kilograms in 1899.

NEW CALEDONIA. More or less copper production was secured from the mines of New Caledonia during the last quarter of the Nineteenth Century, but the mines have been practically idle since 1902, when the output was 3,721 metric tons of copper ore, the greatest production having been 6,349 metric tons, valued at f492,310, in 1899.

There are copper mines in the districts of Bonde, Diahot and Noumea, in the northern part of the island, ore occurrences being noted in the valleys of Diahot, Nehoue and Koumac. The ore occurs as lenses in talcose and chloritic schists, and as stockwerks, the oxidized ores near surface carrying 2 to 4 grams gold per metric ton, while the sulphide ores, mainly chalcopyrite at depth, give considerable silver, this ranging up to 200 to 400 grams per ton from selected ores.

NEW GUINEA. Copper deposits are being exploited in the Astrolabe Mountain range, on the Laloki River, about 15 miles from Port Moresby, in the British portion of New Guinea. The stratified beds are mainly limestone, with occasional sandstone and shale and a few conglomerate tuffs, with diabase intrusions, the district somewhat resembling the Mount Lyell field of Tasmania. A shipment of 17 tons of selected ore, in 1906, gave returns of 26.8 to 32 per cent. copper, with traces of gold.

CHAPTER XXIV.

Copper Mines of the World.

As in the four preceding annual editions of this work, the detailed descriptions of copper mines and companies given in this chapter are printed in alphabetical order, regardless of location. This plan, though having some obvious disadvantages, is found, upon the whole, the best of any tried or suggested, as it renders the work fully self-indexing. In actual practice the plan is not always easy to carry out, owing to the large number of duplicate names, and for various other reasons as well. The definite article has been omitted from all titles in English and German, but could not well be omitted from Spanish and French titles. In cases where the Spanish or French articles are used, the descriptions have been filed upon the name of the mine, rather than the article, except that in the case of American or English companies having Spanish titles, the filing has been done upon the article, whether La, Las, Los or El. This plan of indexing may seem somewhat awkward, but the difficulties encountered in dealing with titles in many different languages, each with its own individual idioms, are by no means inconsiderable.

There are nearly 7,000 titles given in the present chapter, as compared with 256 mine titles in Volume I. and 4,626 titles in Volume VII.

AAMDAL COPPER MINES SYNDICATE, LTD. **NORWAY.**

Dead. Property sold and company wound up, circa 1903. Formerly was at Mo, Telemarken, Christiansand, Norway.

AAMDALS KOBBERVAERK. **NORWAY.**

Mine office: Aamdals Vaerk, Telemarken, Christiansand, Norway. Charles McCully, manager. Was opened circa A. D. 1600 and was a considerable producer for nearly three centuries, making 240 tons fine copper in 1895. Was reopened 1906. Veins formerly worked were narrow, but rich, and considerable low grade ore was developed circa 1903, when under option to the Tharsis Sulphur and Copper Co., Ltd. Diamond drill borings, 1907, gave good cores at depth of 1,400′. Employs circa 300 men.

ABBEY MINING CO. **NEW MEXICO.**

Office: 1007 Bessemer Bldg., Pittsburg, Pa. Mine office: Socorro, Socorro Co., N. M. Nelson Weddle, Jr., president; Earl A. Wheeler, vice-president; H. A. Spangler, treasurer; J. F. Hinckley, secretary; Nathan Hall, general manager. Organized December, 1901, under laws of New Mexico, with capitalization $1,000,000, shares $1 par. Lands, 19 claims, area 380 acres. The Abbey group, 22 miles north of Magdalena, shows 2 parallel veins with about 600′ of workings, carrying ore assaying up to 40% copper and 80 oz. silver per ton. The Washington group, circa 10 miles west of Upham, has a 165′ shaft. Idle several years.

ABBOT CREEK GOLD & COPPER MINING CO. **NORTH CAROLINA**

Office: care of W. J. Brent, Portsmouth, Va. Lands are in Lexington county, North Carolina. Main shaft, 80′, is in a vein giving average ass

$15 per ton, in copper and gold. Has a concentrator and mill with stamps and crusher. Presumably idle.

EN COPPER CO. **NEW MEXICO.**

Formerly at Lordsburg, Grant Co., N. M. Fully described Vol. V.

YLE COPPER MINING CO., LTD. **AUSTRALIA.**

office: Armidale, N. S. W., Australia. Organized 1907, under laws South Wales, with capitalization £15,000, shares £1 par. Lands, 35 miles from Armidale, on the Aberfoyle river, in the New England, showing a 4' vein carrying sulphide ore of about 17% average ...or.

OPPER MINING SYYNDICATE, LTD. **PERU.**

office: Acari, Camaná, Arequipa, Perú. Mines idle at last accounts.

TAL MINING & MILLING CO. **COLORADO.**

office: Granite, Chaffee Co., Colo. Ores carry gold, silver, lead and ...resumably idle.

ES MINE. **ALGERIA.**

office: Collo, Algeria. Lands, 36 kilometers from Collo, show ...e and cupriferous pyrites in schist. In June, 1907, a 50-ton water-...t furnace was being installed to matte the ore.

NSOLIDATED GOLD & COPPER MINING CO. **WYOMING.**

7 Congress St., Boston, Mass. Mine office: Laramie, Albany Co., ... Gramm, president; Geo. M. Colby, vice-president; Arthur S. Howe, ...nd treasurer. Organized May 16, 1905, under laws of Maine, with ...ion $1,000,000, shares $1 par. Is a securities-holding corporation, ..., through stock ownership, the Acme Gold & Copper Mining Co., ... a large amount of standing timber, sawmill, planing-mill and a ...rd at Centennial, Wyoming, an office building at Laramie, town ...ramie and Centennial, the Centennial Post newspaper and the Cen-...ust Co.

...LD & COPPER MINING CO. **WYOMING.**

7 Congress St., Boston, Mass. Letter returned unclaimed from ...ne office, Laramie, Albany Co., Wyo. L. W. Thompson, president; ...Miller, vice-president; Arthur S. Howe, secretary and treasurer. ...ion $400,000, shares $4 par. Is controlled, through stock owner-...Acme Consolidated Gold & Copper Mining Co. Lands, 20 claims, ...d, area reported by company as 514 acres, also a 60-acre mill site. ...known as the Gold Hill group, has 2,454' of workings. Improve-...nde necessary mine buildings, sawmill and stamp-mill. Presumably

...NING & MILLING CO. **COLORADO.**

office: Cotapaxi, Frémont Co., Colo. Has a 50' shaft, planned to ...00'.

...NING & REDUCTION CO. **ARIZONA.**

and mine: Tucson, Pima Co., Ariz. H. H. Pilling, president; ...il, vice-president; Chas. F. Slack, treasurer; Chas. W. Lewis, sec-...yman Bridges, manager; L. W. Waer, mine superintendent. Cap-..., $1,000,000. Lands, 24 claims, unpatented, known as the Acme ...the Amole district, 12 miles from Tucson. Ores carry copper, gold, ...lead.

...PER MINING CO. **MONTANA.**

office: Basin, Jefferson Co., Mont. H. L. Frank, president; Jas. ...manager. Organized 1904, under laws of Montana. Property is ...ine and adjoining claims, carrying gold, silver and copper. Idle.

...MINE. **JAPAN.**

office: Adakai-mura, Yatsuka-gori, Izumo, Japan. County rocks

are Tertiary shale and sandstone, alternating. Principal vein strikes NNE. Ores are bornite, chalcopyrite and pyrrhotite, accompanied by native copper and sphalerite, with clay gouge. Idle.

ADAMS COPPER CO. **WYOMING.**

Mine office: Saratoga, Carbon Co., Wyo. Idle.

ADAMS COPPER MINING & REFINING CO. **COLORADO.**

Office: 513 Cooper Bldg., Denver, Colo. Operating office: 317 McCornick Bldg., Salt Lake City, Utah. Mine office: Steamboat Springs, Routt Co., Colo. Boyd R. Adams, president; B. F. Barnett, vice-president; W. F. McQuarrie, treasurer. Lands, 7 claims, having a 200′ shaft carrying ore averaging about 4% copper. Has steam power. Presumably idle.

ADDIE COPPER MINING CO.

Letter returned unclaimed from former office, Denver, Colo.

ADELAIDE STAR MINES, LTD. **NEVADA.**

Office: 33 Renfield St., Glasgow, Scotland. Mine office: Golconda, Humboldt Co., Nev. P. Coats, chairman; D. M. Boyd, secretary; Glasgow & Western Exploration Co., Ltd., general managers; Otto Stahlman, manager; C. G. Smith, general superintendent; Joseph Farren, mine superintendent. Organized Apr. 21, 1897, under laws of Great Britain, with capitalization £350,000, shares £1 par. No financial statement issued since 1903. Lands, 486 acres, including the Adelaide group of 13 claims, area 238 acres, 10 miles south of Golconda, and the Star group, 4 claims, area 78 acres, at Cherry Creek, White Pine Co., Nevada, also a 170-acre mill site. The Star mine is but slightly developed. The Adelaide mine has a 300′ shaft and in the upper levels carried native silver, the 200′ level showing a good body of medium grade auriferous and argentiferous copper ore, a carload mill test returning $9.40 per ton. A 12-mile narrow gauge private railroad connects the mine with the mill at Golconda. Mine equipment includes a 200-h. p. steam plant, with hoist and 2 air-compressors.

The 100-ton reduction works include a 30-ton sampler and treat custom ores as well as company's own production. The mill uses the Macqueston flotation process of concentration, by which ore is first put through crushers, then through steel rolls, going to Huntington mills and then to the Macqueston plant, which has 100 concentrator tubes, each 18″ in diameter and 6′ in length, arranged side by side in 4 tiers. More than one-half of the tubes are immersed in water, and ore is carried through by endless screws, going out of the tubes at surface into settling tanks below. Concentrates not caught in the first tier of tubes pass into the next set, and so on, the process being completed in the third set. It is claimed that this process gives extraction of better than 99.75% of assay values, which claim seems too good to be entirely true. Work was resumed, 1907, at the Adelaide mine, which was producing circa 70 tons daily in August, 1908.

ADELINE MINES, LTD. **AUSTRALIA.**

Office: 50 Lime St., London, E. C., Eng. Mine office: Drake, N. S. W., Australia. G. Martin Inglis, chairman; W. N. Redman, secretary. Organized Sept. 5, 1902, under laws of Great Britain, with capitalization £100,000, shares £1 par; £30,577 issued, fully paid. Idle.

ADIRONDACK MINE. **MONTANA.**

Owned by North Butte Mining Co.

ADMIRAL GOLD & COPPER MINING CO. **NEW MEXICO.**

Office: Sterling, Kansas. Letter returned unclaimed from former mine office, Tusas, Rio Arriba Co., N. M. C. A. Cooper, president; W. M. Bisbee, secretary. Organized 1900, under laws of New Mexico, with capitaliza $500,000, shares $1 par. Lands, 5 claims, area 120 acres, in the Bromide

trict, showing 3 fissure veins of 10′ average width, carrying sulphide ores, opened by 3 shafts, deepest 130′. Idle for some time.

ADMIRAL TOGO-ELY COPPER CO. **NEVADA.**

Letter returned unclaimed from former mine office, Ely, White Pine Co., Nev. A. R. Worth, president; C. R. Faulstich, secretary. Organized under laws of Arizona, with capitalization $3,500,000, shares $1 par. Lands are 2 claims about 5 miles north of Ely; one claim 24 miles north of Barstow, California and 2 placer claims in the Uoolgardie district of San Bernardino county, California. Apparently a stock-jobbing enterprise.

ADVANCE DEVELOPMENT & MINING CO. **ARIZONA.**

Office and mine: care of Parker L. Woodman, president, Bisbee, Cochise Co., Ariz. Alex. Erickson, superintendent. Organized 1906, under laws of Arizona, with capitalization $1,000,000, shares $2.50 par. Lands, sundry claims 3 miles from Bisbee, opened by a 30′ shaft, showing ore assaying well in gold and copper. Idle.

ADVENTURE CONSOLIDATED COPPER CO. **MICHIGAN.**

Office: 32 Broadway, New York, N. Y. Mine office: Greenland, Ontonagon Co., Mich. Jas. L. Bishop, president; Chester L. Dane, vice-president; W. R. Todd, secretary and treasurer; preceding officers, Chas. J. Devereaux, James S. Dunstan, Stephen R. Dow and Chas. D. Hanchette, directors; W. A. O. Paul, assistant secretary and treasurer; Chas. L. Lawton, general superintendent; A. H. Sawyer, engineer; S. A. Prince, clerk.

Organized Oct. 17, 1898, under laws of Michigan, with capitalization $2,500,000, shares $25 par; paid in, $20.50. American Loan & Trust Co., Boston, registrar; Old Colony Trust Co., Boston, transfer agent.

Lands include the old Adventure and Hilton tracts, in one body to the eastward, and the Knowlton tract, one mile southwest, with total area of 1,696.22 acres on the mineral belt, also a millsite on Lake Superior. The mineral lands are located in Sections 35 and 36, Town 51 North, Range 38 West, and in Sections 1 and 2, Town 50 North, Range 39 West. The Toltec and part of the Belt lie on the north, Aztec on the east, Toltec and Mass on the south, and the Mass on the west of the main tract. The Knowlton tract has the Mass to the north and east, Flint Steel to the south and Michigan to the west, the Ridge mine of the Mass lying between the two Adventure tracts. The village of Greeland lies on the northwestern corner of the Adventure's principal tract, and the village of Maple Grove, controlled by the company, is near the mine.

The old Adventure mine was opened in 1850, along a line of ancient pits showing prehistoric mining. The largest annual production was 116 tons, 1,941 lbs. fine copper, in 1857. After closed by the owners, the old openings were worked for years by tributors, proving notably rich in silver.

The Hilton, or Ohio mine, opened 1863, on the Mass lode, never was worked vigorously. The Knowlton was opened in 1853. These three old mines made 974 tons, 1,173 lbs. fine copper, previous to their merging as the Adventure Consolidated, which started work Nov. 1, 1898.

The Adventure has a series of 7 parallel copper-bearing beds in a cross-section of about 1,200′ and these, coupled with the existence of Adventure Bluff, a 300′ hill, have caused the opening of the mine by adits as well as by shafts. The "South Range," or "Evergreen Belt" of Ontonagon county, comprises a belt of bedded traps, amygdaloids and conglomerates, 7 of these amygdaloids carrying copper on the Adventure tract. These beds were fully described in Vols. I to VII, inclusive.

The cupriferous lodes of the Evergreen belt are notoriously bunchy, being rich in spots and worthless at other points. The strike of the parallel lodes of the Adventure is N. 73° E. on the main tract, where operations were con-

ducted, shafts being sunk at an angle of 45°. There are 4 tunnels and latter, except No. 1, in the Merchant lode, being sunk on the Know at 45°, and numbered from west to east.

The mine equipment includes a 38x59′ steel boiler-house with three Burt boilers; a 59x59′ steel engine-house having an Allis-Chalmer double-cone direct-acting hoist with 42x60″ cylinders, capable of raisi ton load from a depth of 5,000′ on an incline of 45° at a speed of 2 minute, and a 38x65′ steel compressor-house having a 60-drill Rand-Co compressor. There is a complete electric light and power plant and p from fire is furnished by water-mains. The principal mine build sheathed with steel and painted, and the property is served by a spu Copper Range railroad.

The stampmill, at Edgemere, on Lake Superior, went into co Sept. 22, 1902. The mill, built and equipped by the Allis-Chalmers C has been sued for defective construction, is 135x217′, of steel on stone tions, with a 69x72′ boiler-house and 32x72′ pump-house. Equipment 3 Allis-Chalmers heads, fitted with Parnall-Krause mortars having 11-1 ings in discharge screens, with two horizontal revolving screens havi openings for each head. The stamp pistons are automatically rotated, ing wear on the shoes. From the revolving screens of the heads the rock goes to the separator jigs, 24 for each head, or 72 for the mill, t 36 finisher jigs. There are round slime-tables, 3 Overstrom and 3 Wil centrators, and Huntington mills for the raggings. The rock-bins hav age capacity of 4,500 tons. Coal is delivered from trestles to boiler-r gravity, through chutes. The pump is a 16,000,000 gallon Riedler, dra supply from Lake Superior through a tunnel extending 1,200′ under Miscellaneous improvements at the mill site include an office, smithy, shop, dwellings, etc. There is 8′ to 12′ of clear water offshore, permit landing of cargoes from scows, in good weather.

The operation of the Adventure mine proper proved disappointin year showing a loss. The average contents of all rock stamped was o lbs. fine copper per ton, and during the last half of 1907 fell to 8.7 ton, an absolutely hopeless figure, hence mining was entirely suspend in 1908. Production, 1907, was 1,244,874 lbs. fine copper.

By reason of the highly promising copper discoveries made by t Copper Co., diamond drill boring was begun in the spring of 1908, with and 3 rich cores have been secured, 2 having been cut July, 1908, from hole, about 750′ apart, the second being supposed to have been taken Lake bed, though this is not certain, and having about 10′ only of sc balance being sludge assaying 4.5% copper. The cores were taken fr of 26′ and 30′ estimated width, the wider bed not carrying copper fo tire width. The overburden is very heavy, holes being drilled from ground. The future of the Adventure evidently lies in the new beds possibly, if a big and successful mine is opened thereon, the old work be operated to advantage at some future time. The horizon of the 2 r must be opened by an entirely new line of shafts. The company's d 1907 was about $86,000, and quick assets May 31, 1908, were $51,475.

AEOLIAN CONSOLIDATED COPPER MINING CO., LTD.

Mine office: Mullan, Shoshone Co., Idaho. Alfred Andrieux, p Geo. E. Phipps, vice-president; Marguerite Andrieux, treasurer; Clara secretary; preceding officers, Louis L. Durand, Alexis Daneau and F Knight, directors. Lands, 9 claims, area circa 140 acres, near the Deadman's Gulch, 3 miles from Mullan. Property, fairly timbered, well defined veins in quartzite, circa 400′ apart, the south vein bein 40′ and the north vein 4′ to 10′ wide, opened by a 310′ tunnel on t

vein and a crosscut tunnel on the north vein, showing ore assaying well in copper, gold and silver.

AETNA COPPER CO. **MICHIGAN.**

Dead. Sold lands, 1905, to Keweenaw Copper Co. Formerly in Keweenaw county, Michigan.

AETNA GOLD & COPPER MINING CO. **UTAH.**

Mine office: Bingham Canyon, Salt Lake Co., Utah.

AETNA MINING CO. **WYOMING.**

Office: Merrill, Wis. Mine office: Riverside, Carbon Co., Wyo. Julius Thielman, president; E. F. Hanf, secretary. Organized under laws of Wyoming, with capitalization $1,000,000, shares $1 par. Lands, 7 claims, area 140 acres, in the vicinity of Beaver Creek, circa 12 miles south of Encampment, showing 4 veins of 3' to 6' width, as fissures and as contact veins between granite and quartzite, carrying chalcopyrite, bornite and chalcocite, estimated to average 25% copper, and developed by a shaft of 200' and tunnels of 125' and 380'. Has a 40-h. p. steam plant.

AFORTUNADA COPPER MINES, LTD. **SPAIN.**

Dead. Title changed, 1903, to Rio Rimal Copper Co., Ltd. Formerly at Figueras, Gerona, Spain.

AFRICAN & AUSTRALIAN CO., LTD. **AUSTRALIA.**

Office: Broad Street House, London, E. C., Eng. J. B. Palmer, chairman; H. J. Dixon, secretary. Organized Apr. 7, 1902, under laws of Great Britain as a third reconstruction of the West Australian Mining Co. and Victoria Copper Co., with capitalization £120,000, shares 2s. par. Holds stock interests in the Copper Selection Syndicate, Ltd., and various other enterprises.

AFRICAN COPPER DEVELOPMENT CO. **TRANSVAAL.**

Mine office: Middelburg, Transvaal. J. F. Davies, consulting engineer. Lands, in the Middelburg and Pretoria districts, are being developed by shafts.

AFRICAN COPPERS, LTD. **TRANSVAAL.**

Office: Exploration Bldg., Johannesburg, Transvaal. Mine office: Middelburg, Transvaal. Jerry F. Davies, manager. Organized under laws of Transvaal with capitalization £15,000. Lands are 1,025 claims on the farm Rietkloof, having 3 shafts, known as No. 1, New and Marnitz, latter, 160' deep, showing malachite and bornite. Begun shipping ore to Middelburg by wagon, September, 1907.

AFRICAN NOBLE DUKE GOLD & COPPER MINING CO. **ARIZONA.**

Dead. Formerly infested Bisbee, Cochise Co., Arizona.

AFRO-AMERICAN MINING & MILLING CO. **MONTANA.**

Mine office: Butte, Silver Bow Co., Mont. Chas. F. Jones, president; Anna Lee, secretary; Andrew G. Hansen, treasurer. Organized 1905, by negro residents of New York and Montana, with capitalization $500,000. Lands, 18 claims, including 5 claims in the northwestern part of Butte district, 5 claims in Madison county and 5 claims in Lewis & Clark county, Montana, latter having a 100' shaft showing ore giving fair assay values in copper, silver and gold.

AFTERTHOUGHT MINING CO. **CALIFORNIA.**

Dead. Lands sold to Great Western Gold Co. Formerly at Redding, Shasta Co., Cal.

AFTON MINING & SMELTING CO. **MONTANA.**

Dead. Formerly at Helena, Lewis & Clark Co., Mont. Described Vol. V.

AGASSIZ MINING CO. **ARIZONA.**

Dead. Formerly at Ray, Pinal Co., Ariz. Described Vol. VI.

AGATE HARBOR MINE. **MICHIGAN.**

Office: care of Mrs. Anna Scott Beck, owner, 160 Washington St., Chi-

cago, Ills. Mine office: Eagle River, Keweenaw Co., Mich. Lands w slightly prospected, many years ago, but property never was a producer.

AGGER CONSOLIDATED MINES, LTD. GERMAN

Letter returned unclaimed from former office, Finsbury Pavement Hou London, E. C., Eng. Mine office: Siegen, Prussia, Germany. F. Lewis, s retary; Heinrich Noelling, mine manager. Organized Feb. 15, 1906, un laws of Guernsey, with capitalization £150,000, shares £1 par. Property is Aggerburg group of copper, zinc and lead mines, area 2,880 acres, in the Be burg district of western Prussia.

MINA AGUA BLANCA. MEXI

A property at Autlán, Jalisco, Mexico, controlled by the Mexican Inve ment & Development Co.

AGUASCALIENTES METAL CO. MEXI

Office and mine: Asientos, Ocampo, Aguascalientes, Mex. Dr. Chas. Bennett, president; Chas. P. Doerr, vice-president; Victor Hunton, secret and treasurer; Albert Doerr, general manager; Geo. A. Crowder, mine su intendent; Robt. N. Woodworth, engineer. Organized Dec. 31, 1900, un laws of Mexico, with capitalization 35,000 pesos, shares 500 pesos par.

Lands, 82 hectares, in the Asientos and Tepezalá districts, including Merced and San Simon mines at Asientos, and a group 3 miles from Tepez Properties show 5 lenticular ore bodies, between limestone and calcare slate and porphyry, with silicious limestone gangue, of which 4, under de opment, average about 5′ in width, carrying ore averaging about 3% cop 10 oz. silver and $2 gold per metric ton. The Merced-Orito, 8 kilometers w of Cobre station, on the Mexican Union Railway, has 2 veins of 3 to 5 met average width, carrying lenticular ore chutes, opened by shafts of 300′ and 4 with about 2 miles of workings. Mine is very dry and is lighted by inc descent lamps. The San Simon y Anexas group has tunnels of 100 and meters, and a 200′ shaft and the San Nicolás has a 150′ shaft.

Equipment is excellent, including a 100-h. p. De Laval steam turbine namo and Cameron electric triplex pump, with 20-h. p. and 50-h. p. elec hoists, good respectively for 1,000′ and 3,000′. Buildings include a 15x stone machine shop, 20x40′ stone and adobe carpenter shop, 20x30′ smit power-house, hospital, office building, etc. Fuel is West Virginia coal, c ing 16 pesos per metric ton. Average cost of mining is 10 pesos per me ton, and of smelting 12 pesos. Production, 1906, was circa 1,000,000 lbs. copper, and for 1907 was circa 600,000 lbs. fine copper. Mine employs ab 200 men. Company, which is a close corporation, controlled by one family, wisely managed, and has accumulated a considerable surplus, instead of ginning dividends immediately, as is too commonly the case.

AGUILA AMALGAMATED MINING CO. MEXI

Office: care of J. Burpee Neily, 183 Summer St., Boston, Mass. M office: Hostotipaquillo, Ahualulco, Jalisco, Mex. Jos. P. Burlingame, v president; Eugene N. Estis, secretary; Jas. A. Floyd, treasurer. Organi with capitalization $6,000,000, practically as a reconstruction of the Maze Consolidated Mining Co.

AGUASCALIENTES SMELTER. MEXI

Owned by American Smelting & Refining Co.

AHMEEK MINING CO. MICHIGA

Office: 199 Washington St., Boston, Mass. Operating office: Hought Mich. Mine office. Kearsarge, Keweenaw Co., Mich. Albert S. Bigel president; Norman W. Haire, vice-president and general manager; W. J. La secretary and treasurer; preceding officers, Clarence H. Bissell, Thos. L. Ch bourne, Edward S. Grew and Walter A. S. Chrimes, directors; Wm. J. Ur superintendent; Frank H. Haller, assistant superintendent; Russell Smi

surface superintendent; Thomas Rapson, chief mining captain; Chas. D. Hohl, engineer; John T. Reeder, chief clerk and purchasing agent; Wm. Veale, clerk; H. B. Clausen, superintendent motive power. Organized 1880, under laws of Michigan, with capitalization $1,250,000, shares $25 par; $17 paid in. Last call on capital stock was $5, Feb. 5, 1904. Annual meeting, first Friday in July.

Lands, 920 acres, lying west and south of the Mohawk, set off, 1880, by the Seneca Mining Co., to work the Kearsarge, or Houghton, conglomerate. Under the management of Capt. John Daniell 2 shafts were sunk on this bed, which averages about 70′ width, with 3 paystreaks, of 2′ to 3′ width each, aggregating 7′ width, each carrying copper in good quantities, but not payable, owing to great width of partially or wholly barren rock. Resumed work Dec. 2, 1902, and exchanged 11.188 acres with the Allouez, in July, 1903, for an equal area, this giving each property a better arrangement of lands for development. The Kearsarge lode was located by diamond drill in the spring of 1903, and was immediately opened.

The mine is opened by two 3-compartment shafts, 1,445′ apart, sunk at 42°, No. 1 being 1,204′ deep at the 9th level, and No. 2 being 1,334′ deep at the 10th level. Drift-stopes were carried in the early stages of production, providing considerable stamp-rock while permitting rapid increase of reserves. No. 1 shaft, which will be cut off by the side lines of the Allouez at a depth of about 3,000′, apparently is the richer of the two. Reinforced concrete has been substituted for wooden sleepers in the shafts, ties being moulded in place upon the natural anchorage of rough rock, cores being left for rods to bolt the rails to the stringers. Concrete stringers are cheaper than wood, and presumably of longer life, though harder upon rails and rolling stock. Each shaft has 2 skips in operation. No. 2 shaft has a rock chute 625′ long, reaching from the 4th to the 9th levels in the hanging, inclining toward the shaft which connects at the 9th level, from which point all hoisting is done. The end of the chute has an apron of one skip-load capacity, loading 7-ton skips in 20 seconds, one man looking after the dumping and filling of both skips, this system effecting a great saving.

There is room for 2 new shafts between the present workings and the Mohawk boundary and sand-pipes have been sunk for opening 2 shafts, which will be started from surface at an angle of 80°, in the form of an inverted "V," with a single shafthouse and rockhouse for both, somewhat similar to the plan used at the Allouez.

Each shaft has a shafthouse connecting with a centrally located rockhouse of brick with a cylindrical steel rock-bin 32′ in diameter and 45′ high, set on a concrete foundation with a tunnel and railroad track beneath, permitting filling of cars by gravity, one man loading a 40-ton car in 15 seconds. The bins have 1,600 tons capacity with an electric shaker and endless conveyor running from crushers to bins.

The power plant, about midway between shafts Nos. 1 and 2, is in 3 sections, the boiler-house being flanked on either side by engine-houses Nos. 1 and 2 for the respective shafts. The boiler house, having 5 boilers, with room for 8, is of structural steel, and the power-houses are of concrete and brick. No. 1 power-house has a 45-drill Nordberg air-compressor and electric light and power plant, liberal use being made of electric power throughout the plant. No. 2 power house has a 60-drill 2-stage Nordberg air compressor. The hoists are duplicate, capable of raising 10-ton loads from a depth of 1 mile, having double conical drums with maximum diameter of 18′ 6″, hoisting 10-ton skips in counterbalance. Buildings include a new machine-shop, 36x160′ warehouse of structural steel frame, connecting with the railroad tracks, and a 44x46′ office

building. The townsite contains about 70 dwellings, with waterworks having upwards of 1 mile of 6" mains, with 10 hydrants.

The Ahmeek has no mill of its own, about 75% of the rock production being milled by the Osceola, and 25% by the Tamarack.

Production to end of 1907 was 10,518,136 lbs. fine copper, of which 5,510,985 lbs. were made in 1907, the 1907 production being secured from 302,733 tons of rock, and the average for 3 years being 18.5 lbs. fine copper per ton, which probably will be exceeded in the future, only 8% of the rock broken underground having been discarded. The mineral returns about 75% copper. The cost of copper for 1907 was about 12 cents per pound, and probably will prove about 10 cents per pound in 1908, and should be reduced in the future. In July, 1908, the mine was producing about 1,000 tons of rock daily, but is in a position to furnish 1,500 tons. It is planned to make, eventually, 20,000,000 lbs. fine copper yearly, and the property is capable of doing it, with further development. The company begun 1908 with a balance of quick assets of $385,571, and further assessments are entirely improbable, though it is likely that earnings will be drawn upon to provide a mill. The Ahmeek is a magnificent property, with a great future, being perhaps the most promising mine yet opened on the Kearsarge lode, and has been developed and managed with great skill and signal success.

COMPAGNIE DES MINES D'AÏN-BARBAR. **ALGERIA.**

Office: 39 Rue Dulong, Paris, France. Mine office: Bône, Constantine, Algeria. Lands, 22 kilometers northwest of Bône, show several veins carrying complex sulphide ores, mainly chalcopyrite, associated with sphalerite and galena. Has a magnetic concentration plant and is experimenting with the Korda process of copper reduction by leaching and electrolysis. Production, 1906, was 7,545 metric tons of washed copper ore, and 1,800 tons of washed mixed ore, ore being calcined and giving, after magnetic separation, 710 tons of copper ore and 649 tons of sphalerite, former estimated to contain 225,000 lbs. fine copper. For 1906 made a net profit of $31,807, paying a 7% dividend.

AJAX MINE. **MONTANA.**

Mine office. Fox, Beaverhead Co., Mont. Noyes & Morse, owners. Ores carry gold, silver, lead and copper. Has a 5-stamp mill.

AJAX MINING CO. **UTAH.**

Office: Salt Lake City, Utah. Mine office: Robinson, Juab Co., Utah. Thos. Weir, president and general manager; Jno. M. Burt, secretary. Capitalization $300,000, shares $10 par. Has liquidated a considerable former indebtedness, ending the fiscal year Oct. 1, 1907, with a $20,000 surplus. Mine has a 1,000' main shaft, and produces ore averaging circa 3.75% copper, 9 oz. silver and $7 gold per ton. Production, 1907, was 123 carloads of ore, carrying circa 150,000 lbs. fine copper.

AJO COPPER MOUNTAIN MINES CO. **ARIZONA.**

Dead. Property sold, January, 1907, to Rendall Ore Reduction Co. Formerly at Gila Bend, Maricopa Co., Ariz. Fully described Vol. VI.

AK-SAR-BEN COPPER CO. **WYOMING.**

Dead. Formerly at Encampment, Carbon Co., Wyo. Described Vol. VI.

ALABAMA GOLD & COPPER CO. **NEW MEXICO.**

Letter returned unclaimed from former mine office, Orogrande, Otero Co., N. M. Property shows large outcrops of iron ore, also veins carrying copper and gold values, with more or less turquoise.

ALADDIN MINING CO. **MONTANA.**

Mine office: Clinton, Missoula Co., Mont. Idle for some years.

ALAKNUNDA COPPER SYNDICATE, LTD. **INDIA.**

Office: 20 Bucklersbury, London, E. C., Eng. Mine office: Devanghur, Garhwal, Oudh, India. Organized Sept. 25, 1907, under laws of Great Britain,

capitalization £6,750, in 600 A shares and 6,000 ordinary shares of £1 par and 3,000 deferred shares of 1s. par. Lands are leasehold.

MEDA MINING CO. **WYOMING.**

Office: care of P. J. Winters, manager, Encampment, Wyo. Mine office: ogs, Carbon Co., Wyo. Lands, 3 claims, near the Charter Oak prop- opened by shallow shafts, deepest 30′, and a 100′ tunnel, said to show en- ging ore. Idle.

MOS MINING CO. **MEXICO.**

ffice: care of L. C. Hanks, secretary and treasurer, Douglas, Ariz. Let- turned unclaimed from former mine office, Alamos, Sonora, Mex. Harry ith, president. Organized February, 1906. Lands, sundry claims below nas, in the Alamos district of Sonora, Mexico, slightly developed, said to argentiferous copper ores. Presumably idle.

MOS SILVER & COPPER CO. **MEXICO.**

ffice: care of J. S. Obermiller, general manager, Philadelphia, Pa. Mine Alamos, Sonora, Mex. Lands, circa 200 acres of mineral property and 300 acres of millsites and water rights, including the Promontorios mine, A. D. 1720, having a 600′ shaft showing a 48′ ore body. Has a 50-ton r.

KA AMALGAMATED COPPER CO. **ALASKA.**

ffice: Seattle, Wash. Mine office: McCarthy's Creek, Copper River t, Alaska. W. A. Mears, president; L. C. Dillman, vice-president and l manager; E. V. Dillman, secretary; H. H. Greer, superintendent. Or- d December, 1905, under laws of Washington, with capitalization ,000.

nds are 113 claims, area circa 2,260 acres of copper claims, stretching about 60 miles, also 168 gold placer claims, 1,200 acres of coal lands and er powers, one of latter having a 500′ vertical fall, available for power es about 6 months yearly. Of the copper claims the Walters, Statesman, ead and Dillman groups give the best surface showings.

he Statesman group, 10 claims, shows native metal, occuring as fine shot lake copper, in slightly amygdaloidal trap, with greenstone walls, the ed, said to be 350′ wide, mineralized for entire width and traced 2,400′, ng occasional copper masses, said to range in weight from a few pounds tons each.

he Walters group, 7 claims in length, shows a vein of 8′ to 10′ average for 1,000′, reported then to swell to 200′ width for 3,000′, then narrow- 8′ to 10′ only, being traceable about 6,000′ in all. Ores are massive te and chalcopyrite.

he Ramshead group, exposed to depth of 100′ by erosion, shows a vein of 16′ width, claimed to carry 8′ to 10′ of massive chalcocite and a 12′ t of quartzose material, balance of ore being a good grade of disseminated te and chalcopyrite, with spar gangue.

he Dillman group, exposed for a depth of about 300′ by erosion, has a of 4′ to 22′ width, traceable by outcrop 6,000′ on company's lands, carry- n average of about 6′ of massive chalcocite, considerably weathered at ce, showing green carbonate stains.

SKA-CALUMET COPPER CO. **ALASKA.**

ffice: 645 New York Blk., Seattle, Wash. Mine office: Valdez, Alaska. . Herrin, president; F. Freeman Evans, secretary; Walter Bowen, treas- Fred Elkins, agent. Organized Jan. 13, 1906, under laws of Washington, capitalization $2,000,000, shares $1 par. Lands, 17 claims, in 2 groups, e Copper River district, adjoining the Hubbard-Elliott, showing bornite chalcocite assaying up to 56% copper and $169 combined gold and silver s per ton.

ALASKA CONSOLIDATED COPPER CO. AL

Office: 512-60 Wall St., New York, N. Y. Hon. W. F. Bay Stewar dent; Ambler J. Stewart, vice-president; Peter Stederoth, secretary; ing officers, John R. Miller, Chas. J. Hutchins, W. B. Bousman, C. B Frank P. Lauer, Herman Barring and Robert Gwynne, Jr., directors. talization $5,000,000, shares $5 par. Company has no connection with poration of somewhat similar title. Lands, 34 claims, mainly on Nugge in the Chitina Basin of the Copper River district, Alaska, said to ha fissure vein traceable 1,000′, carrying ore of 10% average copper tenor.

ALASKA CONSOLIDATED MINING & SMELTING CO. AL

Dead. An abortive reorganization, 1907, of the Alaska Copper Co.

ALASKA COPPER ASSOCIATION. AL

Letter returned unclaimed from former office, Valdez, Alaska. Or 1907, with capitalization $25,000.

ALASKA COPPER CO. AL

Office: 316 Globe Bldg., Seattle, Wash. Mine office: Copp Prince of Wales Island, Alaska. H. B. Bryson, president; A. P. Bu vice-president; Frank C. Lane, treasurer; Henry W. Armstrong, se H. T. Granger, receiver. Organized Feb. 28, 1903, under laws of ington, with capitalization $5,000,000, shares $25 par. Lands, 18 patented, area 360 acres, also 8 patented millsites, area 80 acres, on Harbor, a land-locked haven with deep water. Lands, well timbered, per Mountain, rising to a height of 3,600′, have a partially develope power, with a 22″ steel pipe-line of 1,000′ length, from Reynolds Cree power plant, where there are 2 water wheels of 300 aggregate horse p

The Brooklyn vein, 10′ to 30′ wide, carries chalcopyrite assaying 3 copper. The New York vein, a contact between porphyry and limest to 60′ wide, has given smelter returns of 16.9% to 29.06% copper. P vein is the Indiana, in limestone, near porphyry, giving average assay copper and $6 gold per ton. Mine has 6 shafts, 2 deepest, 230′. Princip opment is by tunnels, 8 in number, of 7,209′ aggregate length. Ores at are oxidized, with occasional native copper, with sulphides at depth. M a 1,400′ ground-tram, connecting with an aerial tram leading to the which has a 350-ton Allis-Chalmers blast-furnace. Buildings include frame machine-shop, 20x70′ frame carpenter shop, 24x36′ smithy, and other structures, with a total of 16 buildings. Property includes a 15,0 mill and gasoline launch. Property produced some matte, latter half but since idle. Is said to have an indebtedness of circa $175,000, and sold its lands. Bankruptcy apparently is inevitable.

ALASKA COPPER CO. NE

Letter returned unclaimed from former mine office, Ely, White Pi Nev. Lands are in litigation with Nevada Consolidated Copper Co.

ALASKA COPPER & COAL CO. AL

Office: 146-45 Broadway, New York, N. Y. Ernest Truslow, se and treasurer. Organized under laws of West Virginia, with capital $3,500,000, shares $10 par, as Alaska Copper Co., and name changed to title. Lands, circa 3,000 acres, patented, 180 miles northeast of Vald known as the Kennicott group. The Bonanza mine, 6 miles above the Kennicott glacier, has a 2′ to 7′ fissure, cutting both bedded rock and stone, apparently at right angles to contact, and is exposed to height on a slope in the greenstone, immediately above the contact. Ores at s are massive chalcocite and bornite, mainly the former, giving average of about 70% copper and 18 oz. silver per ton. A 40′ shaft apparent penetrated the ore body, which seems merely a surface enrichment. Pr formerly was controlled by the Havemeyers, but apparently now is con

by the Guggenheim interests, through the organization of the Kennicott Mines Co.

ALASKA-GALENA MINING CO. ALASKA.

Offices: care of W. W. Catlin, Seattle, Wash. Mine office: Kotsbilkan, Alaska. Property is a short distance from tidewater, and the installation of an aerial tram is planned.

ALASKA GOLD & COPPER CO. ALASKA.

Dead. Title changed to Central Alaska Gold & Copper Co. Formerly at McCarthy's Creek, Copper River district, Alaska.

ALASKA IMPERIAL MINING CO. ALASKA.

Dead. Formerly at Ketchikan, Alaska. Described Vol. VI.

ALASKA INDUSTRIAL CO. ALASKA.

Office: 11 Broadway, New York, N. Y. Mine office: Sulzer, Prince of Wales Island, Alaska. Chas. A. Sulzer, president and general manager; S. J. Frankenstein, vice-president; Col. A. M. Lowry, treasurer; Louis Sarecky, secretary; Evan Jones, mine foreman. Organized Oct. 30, 1899, under laws of New Jersey, with capitalization $1,000,000, shares $1 par. Annual meeting second Monday in November.

Lands, 60 patented claims, area 1,200 acres, also 60 acres in millsite, 80 acres in homestead, and various patented properties. Lands show 7 ... deposits, between limestone and granite, giving average assays of 6% copper, 1 oz. silver and $3 gold per ton. Ore beds are irregular, lying in metamorphic contact veins between igneous rocks and limestone, carrying much chalcopyrite, with some malachite, azurite, bornite and a little ... magnetite and quartz gangue. Mine has 4 shallow shafts, but development mainly by tunnel, with numerous opencuts, having a large ... blocked out for stoping.

The property carries an available water power, rated at 500 h.p., which has been partially developed by a 36" Pelton wheel, ... Beaver Creek and actuating a 6-kw. generator, and a 12" ... water from Jumbo Creek, through a 10" pipe-line of 2,000' length, operating a 35-kw. 3-phase 2,300-volt 60-cycle generator, ... to 220 volts for lighting and power. Mine is equipped with ... blowers and Temple-Ingersoll electric drills.

Mine has a 9,000' Riblet aerial tram, carrying 20 ... pacity each, operated by gravity, with a 600' ... discharging automatically, requiring only one ... main tram has small bins at the mine, and 4,000 ... where there is a 200' wharf, company having a ... ment and buildings are of an extensive nature, ... 150' power plant, smithies, store, office, ... smaller buildings.

Production, 1907, was 1,545,941 lbs. ... oz. gold. Ore went to Ladysmith smelter, ... 306. Company weathered the financial ... out reducing forces, and has no liabilities ... ery considered valuable and manageme...

ALASKA METALS CO.

Mine office: Bruce, Prince of Wales ... perintendent. Property, on the west ... known as the Corbin mine, is under ... dumped.

ALASKA MINING CO.

Office: 230 Atlas Blk., Salt ...

...AL.
...rgan-
Lands
...lying

...FORNIA.
... reopened
20' shafts.

from former mine office, Silver City, Juab Co., Utah. J. W. Neill, secretary, at last accounts. Capitalization $400,000. Idle.

ALASKA MINES SECURITIES CO. **ALASKA.**

Office: 25 Broad St., New York, N. Y. Samuel I. Silverman, president and general manager; Samuel W. Erich, treasurer; preceding officers, Lester Turner, Maurice McMicken and B. E. Barinds, trustees. Organized under laws of Washington, with capitalization $2,500,000, shares $5 par. Controls, through stock ownership, the Hadley Consolidated Copper Co., Uncle Sam Copper Co., and Big Tiger Gold Mining Co. of Nevada. Is said to have paid, 1906, a dividend of 15 cents per share.

ALASKA-NORTHWEST COPPER CO. **ALASKA & BRITISH COLUMBIA.**

Office: Alaska Bldg., Seattle Wash. J. L. Hutton, president; Hon. Edgar Dewdney, vice-president; Porteus B. Weare, first vice-president; Nathan W. Hendricks, secretary; John W. Black, treasurer; Pierre Duryee, assistant treasurer. Organized under laws of Washington, with capitalization $5,000,000, shares $1 par. Lands are in 2 groups, one, of about 50 claims, being near the property of the Valdez-Boston Copper Co., 160 miles by rail from Valdez, at the head of the Lakina river, which empties into the Chitina river, an affluent of the Copper river, carrying native copper in amygdaloidal diabase. The Indian Chief group, on Vancouver Island, British Columbia, which has the principal development, carries mainly bornite and chalcopyrite, said to give average assays of 7% copper and $2.50 gold per ton, opened by 3 tunnels and various opencast workings. Mine has 4,000' aerial tram to tidewater, where 300-ton bunkers are planned.

ALASKA SMELTING & REFINING CO. **ALASKA.**

Office: 82 Beaver St., New York, N. Y. Mine office: Coppermount, Prince of Wales Island, Alaska. Works office: Hadley, Prince of Wales Island, Alaska. Geo. D. Mumford, president; W. J. Steadman, Jr., secretary; Henry Harris, superintendent; Gordon Knox Bell, assignee. Organized July, 1905, under laws of New Jersey, with capitalization $1,000,000. Is closely connected, in ownership and management, with the Brown-Alaska Copper Co.

The smelter, rated at 350 tons daily capacity, has steel buildings, and is connected by an aerial tram and rail with the Brown-Alaska mines. The smelter, blown in Sept. 20, 1904, has a 44x160" furnace, treating ores from the Brown-Alaska and Hadley Consolidated, and obtaining silicious ores for fluxing from the Britannia, making 50% matte, which is sent to the Crofton smelter for refining. Was said, early 1908, to plan a smelter, to be completed 1909, on Resurrection Bay. Employs, normally, circa 150 men. In hands of assignee since Oct. 1, 1907.

ALASKA UNITED COPPER EXPLORATION CO. **ALASKA.**

Office: 551 Coleman Bldg., Seattle, Wash. L. C. Dillman, president and general manager; I. B. Hammond, vice-president; E. V. Dillman, secretary; W. A. Mears, treasurer; preceding officers, W. W. Phillips, Jas. A. Mundy, R. LaBar Goodwin and P. S. Clarkson, directors; Geo. Davidson, superintendent. Organized Nov. 14, 1906, under laws of Washington, with capitalization $12,500,000, shares $1 par. Lands, 137 claims, area circa 2,750 acres, in 12 groups, also 80 acres in smelter-sites and 900 acres miscellaneous lands, on the Chitna and Nizina rivers, in the Copper River district of Alaska. Only exploratory work has been done, property having 4 small tunnels and numerous trenches showing copper ore.

COMPAÑIA MINERA DE ALBAYALDE. **MEXICO**

Mine office: Gomez del Palacio, Mapimí, Durango, Mex. C. E. Wilbert, manager. Has silver and copper ores.

ALBERNI GOLD & COPPER CO., LTD. **BRITISH COLUMBIA.**

Dead. Formerly at Alberni, Vancouver Island, B. C.

ALBION COPPER MINING CO. **MONTANA.**

Mine office: Sunday, Granite Co., Mont. Christian Reichert, president; James M. Hinkle, secretary. Lands, opened by tunnels, show 3 veins, carrying concentrating ore with values in copper, lead, silver and gold. Idle.

ALBION MINING CO. **UTAH.**

Office: care of Hatfield & Sons, Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. Wm. Hatfield, general manager. Property is the Albion group, said to have yielded about $1,000,000 worth of ore under former ownership. A tunnel of 2,800′, being driven to drain old workings and open new ground, shows a fissure vein assaying up to 15% copper, with silver values. Has water power and plans a concentrator.

ALDA COPPER MINES, LTD. **SPAIN.**

Dead. Liquidated May, 1906. Formerly at Cabrales, Asturias, Spain.

ALDA MINING & SMELTING CO., LTD. **SPAIN.**

Dead. Reorganized, 1900, as Alda Copper Mines, Ltd. Formerly at Cabrales, Asturias, Spain.

SOCIÉTÉ MINIERE D'ALDEIRE. **SPAIN.**

Dead. Formerly at Aldeire, Guadix, Granada, Spain.

COMPANHIA MINEIRA ALEMTEJANA. **PORTUGAL.**

Office: 4 Praca d s Remolares, Lisbon, Portugal. Mine office: Beja, Alemtejo, Portugal. Waldemar d'Orey, superintendent. Property is a group of old mines in the San Domingos district, carrying two ore bodies in schists, the carbonate and sulphide ores giving a selected product of about 25% copper tenor. Mines were worked by the Romans.

ALESSANDRO COPPER MINING CO. **NEW MEXICO.**

Dead. Lands sold, 1908, to Copper Gulf Mining Co. Formerly at Silver City, Grant Co., N. M. Fully described Vol. VI.

ALEXANDER y CIA. **BOLIVIA.**

Office and mine: Coro Coro, La Paz, Bolivia. Firm is a very small producer of native copper.

ALEXANDRIA GOLD & COPPER MINING CO. **CALIFORNIA.**

Letter returned unclaimed from former mine office, Randsburg, Inyo Co., Cal. Organized under laws of Nevada, with capitalization $1,000,000, shares $1 par. Lands, 10 claims, unpatented, area 160 acres, in the Argus Mountains, circa 40 miles from Randsburg. Mine was worked formerly in a small way, with a 5-stamp mill, destroyed by waterspout. Has about one-half mile of workings, showing mainly gold and silver values, expected to turn into copper at depth.

COMPAGNIE INDUSTRIELLE ET MINIÈRE DES CUIVRES D'ALGERIE. **ALGERIA.**

Letter returned unclaimed from former mine office, Oran, Algeria. Lands, 1,800 hectares, circa 14 kilometers west of Oran, showing cupriferous sandstone beds of several hundred feet thickness, said to assay 2 to 2.5% copper. Beds are too low in copper tenor to mine profitably, and company is searching for local enrichments of sufficiently high grade to prove workable.

ALGOA COPPER CO., LTD. **TRANSVAAL.**

Mine office: Zoutpansberg, Transvaal. C. A. Rickard, chairman. Organized circa 1906, under laws of Transvaal, with capitalization £4,000. Lands are mining claims, well watered and timbered, on the farm Rotterdam, lying on the west side of the Sand river. In liquidation June, 1908.

ALGOL MINE. **CALIFORNIA.**

Mine office: Spenceville, Nevada Co., Cal. Opened circa 1865; reopened 1899. Has a 50′ vein, with 2″ to 10″ paystreak, developed by two 120′ shafts.

Ores are cuprite, malachite and azurite, also native copper and a little g giving average smelter returns of 20% copper. Has steam power. Idle.

ALGOMA & CALUMET DEVELOPMENT CO. ONTAR

Dead. Lands transferred, June, 1903, to Hermina Mining Co., Ltd. merly at Massey Station, Algoma, Ont.

ALGOMA COMMERCIAL CO., LTD. ONTAR

Office: Sault Ste. Marie, Ont. Mine office: Sudbury, Algoma, Ont. C. Boss, superintendent. Property includes the Elsie, Wilmott and other mi 4 miles from Sudbury, Algoma, Ont.

ALGOMA COPPER & SMELTING CO. ONTAR

Office: care of Eugene Warner, vice-president, Prudential Bldg., Buf N. Y. Mine office: Bruce Mine, Algoma, Ont. Mark B. Schwab, presid Ben. Newman, secretary; Bernard J. Hillman, treasurer. Organized, 1905, under laws of Arizona, with capitalization $3,000,000, shares $10 Lands, 1,550 acres, about 9 miles from Bruce Mine, opened by a 425′ shaft a 175′ tunnel. Has a 300-ton concentrator. No recent developments company apparently inactive. Property fully described under title H Lake Mining Co., Ltd., in Vol. III.

ALGOMA CUSTOM SMELTING & REFINING CO., LTD. ONTAR

Office: Hermann Blk., Fifth St., Calumet, Mich. Works office: The lon, Algoma, Ont. Jos. Hermann, president; F. H. Pollock, vice-president; B. Anderson, treasurer; H. Appleton, secretary; Merchants & Miners' B Calumet, registrar. Capitalization $250,000, shares $5 par. Is closely nected, in ownership and management, with the Hermina, and has begun struction of a custom smelter to contain reverberatory furnaces of the K type, with estimated daily capacity of 500 tons.

ALGONQUIN COPPER CO. WYOMI

Dead. Formerly in Wyoming.

MINA EL ALICANTE. MEXI

Mine office: Mazapil, Zacatecas, Mex. M. Dolores Aguirre y Ca., own Vicente Banavides, superintendent. Ores carry gold, silver, lead and copp

ALICE CONSOLIDATED MINING CO. UT

Office: care of C. C. Dailey, secretary and treasurer, Salt Lake City, U Mine office: Callao, Juab Co., Utah. W. R. Hutchinson, president; W Calloway, vice-president. Capitalization $1,000,000, shares $1 par. Land claims, in the Dugway division of the Deep Creek district, near the St. Ge Copper Mining Co.

ALICE GOLD MINING CO. WASHINGT

Dead. Formerly at Chewelah, Stevens Co., Wash. Described Vol. VI.

ALICE GOLD & SILVER MINING CO. MONTA

Mine office: Butte, Silver Bow Co., Mont. John D. Ryan, general m ager. Has 400,000 shares, and is controlled, through stock ownership, by B Coalition Mining Co. Has a 1,500′ shaft. In 1906 extracted 3,170 tons of giving gross returns of $7.70 per ton and costing, to mine, mill and smelt, $ per ton.

MINA DE ALJUSTREL. PORTUG

Mine office: Aljustrel, Alemtejo, Portugal. Is said to be owned by a gian company. Ore is chalcopyrite, associated with iron pyrites, carryin to 7% copper. Mine is a small but fairly regular producer.

ALLEGHENY MINING CO. NEW JERS

Dead. Property was the Pahaquarry mine, opened by the Dutch, circa 1 Mine was reopened, 1860, by the first Allegheny Mining Co., now dead, reopened 1901, by the second Allegheny Mining Co., also dead. Formerly Belvidere, Warren Co., N. J.

ALLEN MINE. **OREGON.**

Owned by Oregon Homestead Mining & Reduction Co.

ALLGEMEINE ELEKTRO-METALLURGISCHE GESELLSCHAFT. **GERMANY.**

Works office: Papenburg a/d Ems, Germany. Has a small electrolytic plant with capacity of about 500 pounds of cathodes daily, treating nickel-copper anodes.

ALLIANCE COPPER CO. **MONTANA.**

Office and mine: Butte, Silver Bow Co., Mont. Augustus T. Morgan, president. Organized May 19, 1906, under laws of Montana, with capitalization $400,000, shares $2 par. Property is very small acreage in the northeastern portion of the Butte district, with surface rights to sundry town lots. Development is by a shaft, sunk jointly by the Alliance and Farrell companies, and a little ore of good grade was shipped, 1907, from the 200' level. Presumably idle.

ALLIANCE COPPER-GOLD CO. **BRITISH COLUMBIA.**

Mine office: Greenwood, Boundary district, B. C. H. H. Shallenberger, superintendent, at last accounts. Lands include the Moreen claim, in the Deadwood camp, developed by open cuts and a tunnel, showing veins of 4 to [illegible] width carrying low grade auriferous copper ores.

ALLIANCE COPPER MINING CO. **WASHINGTON.**

Dead. Absorbed, 1902, by Iconoclast Consolidated Mines Co. Formerly at Keller, Ferry Co., Wash.

ALLIGATOR & TIGER LEASING CO. **COLORADO.**

Mine office: Red Cliff, Eagle Co., Colo. A. S. Little, manager. Lands, 2 claims, showing massive bornite and chalcopyrite, in fissure veins, traversing granite, ores assaying up to 15% copper, 5% lead, 50 oz. silver and $10 gold per ton.

ALLOUEZ MINING CO. **MICHIGAN.**

Office: 60 State St., Boston, Mass. Mine office: Allouez, Keweenaw Co., Mich. Harry F. Fay, president; Geo. G. Endicott, secretary and treasurer; Jas. MacNaughton, general manager; preceding officers, Alexander Agassiz, F. L. Higginson, F. W. Hunnewell, Quincy A. Shaw, Jr., R. L. Agassiz and W. L. Frost, directors; A. Warne, mining captain. Organized September, 1859, under laws of Michigan, with capitalization $500,000, shares $25 par; reorganized and reincorporated, 1889, under laws of Michigan, with capitalization $250,000, shares $25 par; $22.25 paid in. Last assessment, $3 per share, was levied 1904. Old Colony Trust Co., Boston, registrar. Annual meeting, second Tuesday in March.

Control was secured, 1907, by the Calumet & Hecla Mining Co., through purchase of a large stock ownership. For 1907 the company showed a mining profit of $106,374, and net earnings of $21,528, but the purchase of a half interest in the Centennial mill used up the cash balance, and necessitated the borrowing of $185,000 from the Calumet & Hecla. The year's construction account, including the mill purchase, amounted to $423,000, so that the company began 1908 with a deficit of $338,557.

The old mine, opened 1859, is on the Allouez conglomerate, a bed underlying the greenstone. The conglomerate, 30' wide in many places, with strike of N. 20° E., and dip of 35°, averages 0.7 to 1% copper, and is very refractory under the stamps. There are 2 shafts, deepest about 1,700'. Mining was begun actively in 1869, and stopped in 1877, with an exhausted treasury. The mine was then leased to Watson & Wells, who made money from it, after paying a royalty of one-eighth on gross production. In 1890 the company resumed control, to quit once more, financially exhausted, in 1895. Watson & Wells took the mine again, and once more did well; the company resumed

work on its own account for the third time, and again lost money, stopping all work in 1892. The old mine has been idle for some years, except for exploratory and development work in 1898-1900, when a shaft was sunk 1,200′ on the Osceola lode, and nearly 4,000′ of openings secured thereon, with indifferent results. The shafthouse at the Osceola shaft has been demolished. The stamp-mill, on Hills Creek, has three old-fashioned heads and cannot be used for the new mine. The old Allouez made 13,025 tons, 1,528 lbs. fine copper, 1869-1892.

Lands are circa 3,400 acres, including the main tract of 640 acres on which the mine is opened. In 1903 an exchange of 11.188 acres was made with the Ahmeek. The new Allouez mine is opened on the Kearsarge amygdaloid, which does not outcrop on Allouez lands, hence was opened on the underlay, the bed lying under the entire 640-acre tract. There are 2 shafts, No. 1, with 3 compartments, on the extreme southeastern corner of the tract cutting the lode at 1,480′ depth, with first level opened at depth of 1,264′, the shaft being circa 2,500′ deep. No. 1 shaft leaves surface at an angle of 75°, but at slight depth takes an angle of 80°, continuing thereon to about 1,435′ depth, when a curve of 60′ brings the shaft to the angle of the dip of the bed, at 38° 30′. Owing to the steep pitch of the shaft, back-rails of 6x10″ timber are set so close to the wheels of the skips that their flanges cannot leave the steel rails, the wooden timbers serving as guides. At the change of angle from 80° to 38° 30′, on reaching the lode, a single idler with a very wide flange cares for the cables passing at either end. In order to save pumping charges on surface water, a gutter has been cut entirely around the shaft, this leading to an incline 36′ long, used as a sump, from which the water is forked. The bottom levels of No. 1 shaft are not showing as well as before. No. 1 has a 42x62′ steel shaft-rockhouse, with two 18x34″ crushers.

No. 2 shaft is circa 1,500′ northeast of No. 1, and must go to a depth of about 2,400′ before cutting the Kearsarge lode, but the bed will be reached by crosscuts eastward before intercepted by the shaft. This shaft was forced to start further in the hanging wall than No. 1, on account of the proximity of a lake, and was 1,800′ deep in August, 1908. No. 2 was sunk 120′ in the month of February, 1908, which is a record for the Lake Superior district. The collar of No. 2 shaft is of concrete, Washington fir and 16x24″ steel "I" beams, with 14x14″ square-timber wall plates and 4″ plank sheathing. The interior, from collar to solid rock ledge, is lined with 22″ of concrete, dividers having their ends bedded in concrete, this giving an impregnable shaft through the treacherous sand overburden. Each shaft can be sunk about 9,500′ before reaching the western boundary of the property.

Machinery equipment includes a Nordberg hoist with 32x72″ duplex cylinders and 18′ double-conical drum. No. 2 has the temporary hoist with which No. 1 was sunk. The engine-house is of mine rock with redstone trimmings. A stone boiler-house has five 125-h. p. boilers and a 120′ self-supporting steel smokestack. No. 1 engine-house has 12-drill and 18-drill air compressors, and No. 2 has a 60-drill Laidlaw-Dunn-Gordan air compressor. Miscellaneous buildings include a redstone machine shop and smithy, and a large warehouse. The mine is reached by a spur of the Mineral Range railroad.

Production was begun Aug. 1, 1905, at the Centennial mill, and for 1905 averaged 28.4 lbs. copper per ton. For 1906 production was 3,486,900 lbs. fine copper, and in 1907 was only 2,934,116 lbs., secured from 214,720 tons of rock stamped, which yielded an average of only 13.66 lbs. fine copper per ton, or less than half the returns of 1905. For the first half of 1908 rock tonnage and copper percentage were at about the same rates as in the preceding year. The bed averages about 16′ in width, and for 1907 only 5.6% of the rock hoisted was discarded, the mineral returning 63.56% fine copper. About 400 men are employed. The Allouez has proven very much lower in grade than

was anticipated at the time it was first opened, but an improvement may be looked for with reasonable confidence, and the property, being in strong and experienced hands, should make a fine mine in time.

ALLPORT MINING CO. **MONTANA.**

Mine office: Basin, Jefferson Co., Mont. Capitalization $500,000, shares $1 par.

ALMA COPPER MINING CO. **MEXICO.**

Office: Des Moines, Ia. Mine office: Carbó, Ures, Sonora, Mex. Abner Graves, general manager; Nelson D. Graves, superintendent. Lands, 747 acres, in the Ures district, showing auriferous, argentiferous and somewhat bismuthiferous cuprite, melaconite, azurite, malachite and chrysocolla, assaying up to 37% copper and $13 gold per ton. Has gasoline power. Idle since circa 1905.

ALMA GOLD MINING CO. **COLORADO.**

Office: Idaho Springs, Clear Creek Co., Colo. Theo. Mixsell, manager. Ores carry gold, silver and copper. Has steam power.

ALMA MAY COPPER CO. **WYOMING.**

Office: care of Silas H. Jenkins, general manager, Chicago, Ills. Claude M. Smith, second vice-president; LeRoy Pierce, secretary; preceding officers, Louis Auerbach, John C. Eads and Jos. L. Ebner, directors. Organized Apr. 13, 1906, under laws of Arizona, with capitalization $1,500,000, shares $1 par. Lands, 4 claims, area circa 60 acres, in the Medicine Bow Mountains, Albany county, Wyoming, showing a good gossan capping, opened by a 50′ shaft.

ALMA MINING & MILLING CO. **MEXICO.**

Office: care of P. B. McCabe, Los Angeles, Cal. Letter returned unclaimed from former mine office, Canitas, Zacatecas, Mex. C. A. Heberlein, general manager. Organized 1903. Lands include the San Antonio, San Luis, Terrington and Rosario mines, showing ores carrying 15 to 150 oz. silver per ton, with appreciable copper values.

ALMADO & TERITO CONSOLIDATED MINING CO. **MEXICO.**

Succeeded by Negociacion Minera de Clemente Ybarra.

SOCIEDAD MINERA DE ALMANZORA. **SPAIN.**

Office and mine: care of Don Camilo Bilarge, agent, Javier Sanz, 4, Almeria, Spain. Property is sundry idle copper mines in Almeria.

ALMEDA CONSOLIDATED MINES CO. **OREGON.**

Office: 207 Board of Trade, Portland, Ore. Mine office: Galice, Josephine Co., Ore. O. M. Crouch, president; L. B. Simons, vice-president; R. C. Kinney, secretary and treasurer; John F. Wickham, general manager; P. B. Wickham, mine superintendent. Organized July 18, 1905, under laws of Oregon, with capitalization $15,000,000, shares $5 par, as successor of Almeda Mining Co. Annual meeting, second Tuesday in December. Lands, 40 claims, two 800 acres, well timbered, on the Rogue river, showing 3 large and well defined contact deposits between altered diorite and slate, estimated by company to average 200′ width and said to be traceable 2,300′, showing mainly chalcopyrite, giving average assays of 3.5% copper, 3 oz. silver and $3.50 gold per ton. Development is by tunnels of 250′, 160′, 280′, 450′, 150′ and 45′, with 2,800′ of workings, estimated to show 800,000 tons of ore. Property was worked to slight depth for free gold, circa 1860-1870. Equipment includes 4 mine buildings and a 15,000′ sawmill. A smelter, building 1908, by the Willamette Iron & Steel Co., will have a 100-ton water-jacket blast-furnace. Property is considered promising.

ALMEDA MINING CO. **OREGON.**

Dead. Succeeded July 18, 1905, by Almeda Consolidated Mines Co. Formerly at Galice, Josephine Co., Ore.

SOCIEDAD MINERA EL ALMENDRAL. CHI

Office: Valparaiso, Chile. Mine office: Coquimbo, Chile. Organized ... 5, 1906, under laws of Chile, with capitalization 1,000,000 pesos, shares ... pesos par.

ALMERIA QUICKSILVER & COPPER CO., LTD. SPA

Dead. Liquidated, voluntarily, 1906. Formerly at Berja, Almería, Sp...

COMPAÑIA MINAS DE ALMOLOYA, S. A. MEXI...

Is the Mexican incorporation of the Almoloya Mining Co.

ALMOLOYA MINING CO. MEXI...

Office: 60 Wall St., New York, N. Y. Mine office: Baca, Ramal ... Parral, Chihuahua, Mex. Nils O. Bagge, president, I. B. Newton, secretary; W. C. Paterson, treasurer; D. W. Shanks, general manager; D. C. Joslyn, mine superintendent. Los Angeles Trust Co. and New York Trust Co., registrars. Organized 1903, under laws of Arizona, with capitalization $2,000,000, shares $1 par, in $800,000 preferred stock, at 10%, non-cumulative, and $1,200,000 common stock. Lands, 270 pertenencias, area 730 acres, also a 100-acre mill site, with total holdings of circa 1,000 acres, in the Allende district, about ... miles from the railroad station at Baca. The Sierra de Almoloya is an isolated mountain range, about nine miles long, formation being limestone of Cretaceous age, with two eruptive intrusions. Property adjoins the well-known Cigarrero mine, which shows four ore bodies of good width. Development is by shafts of 68', 140', 270', 350', and 700', and by tunnels of 180', 360', 1,320' and 1,600', with a total of about 6,400' of openings. Property has gasoline, electric, and pneumatic power, with a 60-h. p. producer gas plant for drills. Employs circa 90 men.

ALPHA COPPER MINING CO., N. L. AUSTRALIA.

Mine office: Cobar, Robinson Co., N. S. W., Australia. Organized 1907, with capitalization £1,000, shares £1 par.

ALPHA MINING CO. ALASKA.

Office: Grand Rapids, Mich. Mine office: Dolomi, Prince of Wales Island, Alaska. F. L. Loomis, superintendent. Lands, 3 claims, showing a 5' ore body traceable circa 2,500', giving assays of 2.5 to 7% copper and $3 to $20 gold per ton.

ALSACIA DEVELOPMENT CO. MEXICO.

Dead. Reorganized, 1905, as Alsacia Mining Co. Formerly at Fronteras, Arizpe, Sonora, Mex.

ALSACIA MINING CO. MEXICO.

Office: care of Chas. F. Wrenn, secretary and general manager, Bisbee, Ariz. Mine office: Fronteras, Arizpe, Sonora, Mex. R. L. Whaley, president; John Hermann, engineer. Lands, 23 miles east of La Cananea, in the Ajo Mountains, are opened by a 400' shaft. The 350' level shows argentiferous copper ores giving average assay values of about $25 per ton. Machinery includes a hoist good for 1,000'. Idle.

ALTA CENTRAL COPPER CO. ARIZONA.

Office: 506 Citizens National Bank Bldg., Los Angeles, Cal. Mine office: Florence, Pinal Co., Ariz. Julian P. Jones, president; A. R. Hueth, vice-president and secretary; Citizens National Bank of Los Angeles, treasurer; Col. G. W. Griffey, mine superintendent. Organized Apr. 3, 1907, under laws of Arizona, with capitalization $500,000, shares $1 par. Lands, 7 claims, area circa 125 acres, carrying about one-half mile of the strike of a system of 5 fissure veins, having a north and south trend, in a width of about one mile, passing through Mineral Hill. The Alta Mining & Smelting Co. lies to the north, and the Oklahoma to the south. Country rock is Pinal schist, intruded by porphyry dikes, the 5 fissure veins cutting the schist unconformably with strike or dip, sometimes cutting the porphyry dikes and occasionally running

beside them. The veins outcrop 20' to 50' in width. Several prospect tunnels and shafts show 1' to 6' of ore carrying copper carbonates, oxides, and chalcocite, with gangue of quartz and manganiferous iron ore, carrying combined gold and silver values of $1 to $14 per ton. Geological conditions are markedly similar to those at the Gibson and Live Oak mines, distant about 20 miles to the northeast. Company plans developing through a drift, to be run from the 400' level of the main shaft of the Alta Mining & Smelting Co.

ALTA COALITION COPPER CO. **UTAH.**

Office: care of N. Y. Stringham, secretary, Salt Lake City, Utah. Mine office: Brighton, Salt Lake Co., Utah. F. R. Snow, president; B. F. Grant, vice-president. Organized, early 1907, to develop a group of claims in the Big Cottonwood district.

ALTA COPPER CO. **MONTANA.**

Mine office: Jefferson, Corbin Co., Mont. Was promoted by Marcus L. Hewett, with capitalization $10,000,000, shares, $10 par. Lands include the Alta mine, supposed to carry the continuation of the ore body in the Bertha claim of the Boston & Corbin, also 700 acres of placer ground and sundry water rights. The old Alta mine has a 1,600' incline shaft, and a new shaft is planned. Has a concentrator.

ALTA COPPER MINING CO. **IDAHO.**

Mine office: Ketchum, Blaine Co., Idaho. Lands, 5 quartz claims and 8 placer claims, in Cain Cañon, near the base of Mount Hindman, 18 miles from Ketchum, opened on the American claim by a 150' tunnel cutting a 7' vein.

ALTA CROWN COPPER CO. **CALIFORNIA.**

Office: 10 Howard St., Spokane, Wash. Jas. F. Marrs, president; Frank Liddell, vice-president; G. Major Taber, secretary and treasurer. Organized under laws of Arizona, with capitalization $2,000,000, shares $1 par. Lands, 10 claims, area 200 acres, in the Bullion district of Inyo county, California. According to prospectus of this company, the predominant rock form is a white crystalline limestone-granite, with intrusive dikes of porphyry with limestone carrying "amygogules" of copper pyrite, which certainly is a most unusual and decidedly interesting formation. Has shafts of 40' and 110', with several short tunnels, showing azurite, malachite, chalcocite, bornite and chalcopyrite, assaying 12 to 32% copper, from 4 to 15 oz. silver and from a trace to $8.20 gold per ton. Smelter returns have given 18 to 20.5% copper, 9 to 10 oz. silver and 92 cents to $11.66 gold per ton.

ALTA & HECLA MINING & MILLING CO. **UTAH.**

Office: 210 Brooks Arcade Bldg., Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. Employs 14 men. H. Bamberger, president; S. Holden, vice-president; Geo. H. Watson, secretary, treasurer and general manager; preceding officers, C. H. Gabrielson and A. J. Byron, directors; A. C. Newell, superintendent. Organized May 22, 1906, under laws of Utah, with capitalization $150,000, shares 25 cents par. Lands, 14 claims, area 250 acres, partly patented, also a 10-acre millsite, in the Little Cottonwood district, showing 6 fissure veins and contact deposits, of which 3 have been opened, by the 900' Scott tunnel, 160' Never Sweat tunnel, and an 80' crosscut tunnel, mine having 1,620' of workings, estimated to show 10,000 tons of ore, veins averaging 7' width, and said by company to average 3% copper, 26% lead, 4% zinc, 22 oz. silver and $2.40 gold per ton. Has several mine buildings and plans continuing development.

ALTA-IDAHO GOLD & COPPER MINING CO. **IDAHO.**

Office: care of John M. Nuss, secretary, Nescopek, Pa. Mine office: Pardee, Idaho Co., Idaho. J. B. Nuss, president; Geo. M. Snyder, vice-president and general manager. Organized December, 1902, under laws of Delaware, with capitalization $1,000,000, shares $1 par. Lands, 11 claims, area 209 acres,

also a 5-acre smelter-site, in the Lolo district. Development is by sundry test pits, deepest 35′, and three tunnels, longest 1,500′, showing stringers of melaconite, azurite, chalcocite, bornite and chalcopyrite.

ALTA MINING & MILLING CO. WYOMING

Office: 490 Quincy Bldg., Chicago, Ills. Mine office: Lusk, Converse Co., Wyo. P. C. Conley, secretary and treasurer. Property is the Rawhide Butte group. Idle.

ALTA MINING & SMELTING CO. ARIZONA

Office: 514 Delta Bldg., Los Angeles, Cal. Mine office: Florence, Pinal Co., Ariz. L. H. Sherman, president; Col. G. W. Griffey, vice-president and general manager; J. C. Ferrall, secretary and treasurer. Organized Sept. 8, 1905, under laws of Arizona, with capitalization $5,000,000, shares $1 par. Annual meeting, first Tuesday in September. Lands, 25 claims, area 470 acres; also a 200-acre ranch, in the Mineral Hill district, near the Lake Superior & Arizona, circa 16 miles east of Florence. Lands show veins in schist and contact deposits between schist and porphyritic rock, ranging 5′ to 50′ in width, opened by shafts of 96′, 127′ and 150′, with about 3,000′ of workings showing ore assaying 2 to 57% copper, with gold and silver values, also a lead vein showing ore assaying 2 to 57% lead, 4 to 15 oz. silver and 80 cents to $1 gold per ton. Has steam power, with hoist good for 1,000′, a 4-drill Leyner air-compressor and 9 mine buildings. Company plans continuous development along sensible lines.

MINA ALTAMIRA. CHILE

Mine office: San Lorenzo, Combarbalá, Coquimbo, Chile. Jerónimo Tapia, owner and manager. Property is 18 leagues from a railroad station, with 2 pesos freight charges per metric ton. Mine shows a vein of about one meter average width, developed to depth of 260 meters. In 1903 production was 12 metric tons of 22.5% copper ore, made by 27 men.

ALTAMIRA MINING CO. MEXICO

Office: care of W. W. Mathews, president, Etztlán, Jalisco, Mex. Mine office: Ahualulco, Jalisco, Mex. R. R. Landrum, superintendent. Property is said to be controlled, through stock ownership, by the Jalisco Mining Development Co.

ALTA MIZPAH COPPER & GOLD MINING CO. UTAH

Letter returned unclaimed from firm office, care of C. J. Jenkins, Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. Organized 1907, to develop property near Alta, which is said to show considerable ore of milling grade.

ALTAMONT MILLING CO. NEW MEXICO

Office: Altamont, Ills. Mine office: Jarilla, Otero Co., N. M. Capt. L. H. Williams, president. Lands include the Cuprite mine, having a 140′ shaft, said to show 12′ of medium grade chalcopyrite, with limestone gangue. A small smelter shipment from the 80′ level gave net returns of $8 per ton.

ALTA-PERUVIAN MINING & MILLING CO. UTAH

Office: Springville, Utah. Letter returned unclaimed from former mine office, Alta, Salt Lake Co., Utah. F. J. McAuliffe, president; T. R. Kelley, secretary and treasurer. Organized 1904 with capitalization $200,000, shares $1 par. Lands, 4 claims, in the Little Cottonwood district. Idle.

ALTA-QUINCY MINE. UTAH

Dead. Merged, 1906, in South Columbus Mining Co. Formerly at Alta, Salt Lake Co., Utah. Described Vol. VI.

ALTA-ST. LOUIS MINE. UTAH

Letter returned unclaimed from former mine office, Alta, Salt Lake Co., Utah. W. M. J. Craig, manager, at last accounts. Mine has a vein betwee

limestone and shale carrying a 12" to 18" paystreak assaying 15 to 25% copper and 15 to 240 oz. silver per ton, with small gold values.

ALTA-SUPERIOR MINING CO. **UTAH.**

Mine office: Alta, Salt Lake Co., Utah. Has a 300' tunnel, and at last accounts was in litigation with the South Columbus and Columbus Consolidated over the projected 4,000' drainage tunnel started on the Snow Bird claim of the Alta-Superior.

ALTATA MINING CO. **ARIZONA.**

Office: 145 La Salle St., Chicago, Ills. Mine office: Chloride, Mohave Co., Ariz. J. F. McBride, president and general manager; L. L. Funk, vice-president; W. A. Barr, secretary and treasurer; C. H. Dryden, superintendent. Bonds, $25,000 authorized; $12,000 issued. Mine has a 200' shaft, showing silver-lead and auriferous copper ore. Has steam power.

ALTA-ZOANNI MINING CO. **NEVADA.**

Mine office: Hamilton, White Pine Co., Nev. Roy W. Schenk, president and general manager; M. T. Collins, vice-president; G. A. McElery, secretary and treasurer. Lands are near the peak of White Pine Mountain.

KÖNIGLICHES HÜTTENAMT ALTENAU. **GERMANY.**

Office and works: Altenau im Harz, Germany. Is a custom smelting plant, treating ores of copper and other metals from the mines of the Hartz. Has an electrolytic refinery, with daily capacity of 1,600 to 2,000 lbs. of cathodes.

ALTENS KOBBERGRUBER. **NORWAY.**

Office: care of Sulitelma Aktiebolag, Helsingborg, Sweden. Mine office: Kåfjord, Finmarken, Norway. Lord-Lieutenant G. Tornerhjelm, chairman; Consul N. Persson, vice-chairman; C. Ingelsson, secretary; A. Quale, general manager; B. G. G. Tiberg, mine superintendent; Ch. Rosenquist, smelter superintendent; Sverre Falch, mill superintendent and chemist. Lands, 339 claims, also a 60-acre millsite and circa 2,000 acres miscellaneous lands. This is the northernmost copper mine in the world, lying near North Cape, in 70° north latitude. Post-silurian schists and slates have been penetrated by dioritic greenstone, showing about 75 ore bodies in diorite and also as impregnations in dolomitic strata. The veins have a generally NNW. strike, fissures in diorite dipping at about 30° and dolomitic layers at about 60°. About 20 strong veins and many small ones are under development, former ranging 1 to 3 metres in average width, and traceable 50 to 2,000 metres. The various veins average about 1.25% copper, the metal occurring as chalcocite, bornite and chalcopyrite disseminated in pyrite.

Development is by numerous tunnels, of which the Sture is 650 metres and the Jernmalm 415 metres in length, and by 6 shafts, deepest 100 metres. The mine has several miles of workings, exposing fully 600,000 tons of ore, with circa 100,000 tons blocked out for stoping. Mine, opened 1825 and closed 1878, was reopened, 1895, by present owner.

Equipment includes 120 hydraulic h.p., 100 electric h.p., 25 steam h.p. and 15 gasoline h.p. There are 4 small hoists, 2 Sullivan diamond drills and an electric light plant. Buildings include a machine shop of 220 square metres area, a 40-metre carpenter shop and 170 buildings of all classes, including dwellings.

The 100-ton concentrator, of 1,716 square metres area, has 2 Blake crushers, 4 Humboldt centrifugal crushers, 2 rolls, 11 jigs, 16 Lüborg vanners and 4 large and 8 small spitzkasten. The smelter has a 20-ton water-jacket blast furnace, smelting to a 20% matte, which by a second fusion is brought up to 60% copper tenor and shipped to Helsingborg for refining.

The mine is 300 miles from a railroad, but only 300 feet from the sea. The company owns a steamer and a gasoline launch. A school is maintained. Production, 1907, was 25,000 metric tons of ore yielding 1,050 tons of matte

and 600 tons of 48% sulphur ore, producing circa 625,000 lbs. fine copper. T property has a strong and progressive management.

GEWERKSCHAFT ALTFALTER. GERMAN

Mine office: Altwalnau, Hirschberg-Grosselmerode, Hessen-Nassau, G many. Has copper-lead ores, with one shaft, employing circa 25 men.

ALTO COPPER CO. ARIZON

Office: 43 Exchange Pl., New York. Mine office: Patagonia, Santa Cr Co., Arizona. Geo. A. Beaton, president; Geo. O. Earhart, secretary; Geo. Lockley, treasurer; J. N. Curtis, general manager. Organized Apr. 4, 190 under laws of Maine, with capitalization $3,000,000, shares $100 par. Bond $750,000, at 7%. Annual meeting, first Tuesday in April. Lands, 21 claim area 420 acres, 8 miles from Patagonia, in the Santa Rita Mountains, ne the Mexican border, developed by tunnels of 187' and 400' and by about antigua shafts, of 30' to 70', and by 3 new shafts of 73', 100', and 150', w circa 3,000' of underground openings, estimated by the company to show 500,0 tons of ore blocked out for stoping, which is much too high. Ore is mai chalcopyrite, associated with galena and sphalerite, giving assays of 8 to 1 copper, 10 to 20% lead, 10 to 30 oz. silver and $3 to $20 gold per ton. steam power with 3 hoists, good for 600' each, and an 8-drill Sullivan compressor. Has a 20x40' machine shop, smithy, and about 25 miscellane buildings, including dwellings. The ore, from its complicated nature, will p refractory in reduction. Presumably idle.

ALTO MINING CO. ARIZO

Dead. Lands sold, January, 1908, to Leontine Consolidated Mining Formerly at Poland, Yavapai Co., Ariz.

ALVERDSKI MINE. RUS

Owned by Compagnie Française des Mines de Cuivre d'Akhtala.

ALYCE MINERAL CO. GEOR

Office: care of E. C. Gothard, secretary and treasurer, Knoxville, J. G. Sterchi, president; Joe P. Davis, vice-president; preceding officers, Haun, Gus N. Miller and N. S. King, directors. Lands are several tho acres in Murray county, Georgia, about 30 miles east of the Ducktown of Tennessee, showing ores giving assay values in lead, copper, silver and

AMADOR CONSOLIDATED MINING & DEVELOPMENT CO. MONT

Office: 507-172 Washington St., Chicago, Ills. Mine office: Iron Mou Missoula Co., Mont. William Surman, president; Geo. Lill, vice-pres D. E. McKinnon, secretary and general manager; P. F. Smith, rec Organized March 16, 1903, under laws of Arizona, with capitaliz $10,000,000, shares $5 par. Property is the entire stock issue of the Am Copper & Gold Mining & Milling Co.

Mine is described under title of owner, the Amador Copper & Gold Mi & Milling Co., and smelter under name of owner, the Amador Smelting Co., two latter named corporations being the underlying companies, while Amador Consolidated was the stock jobbing corporation. McKinnon, who practically the entire company, and has been accused of crookedness in ot deals, is said to have sold about $350,000 of stock of this company. M L. M. McKinnon, wife of the promoter, is endeavoring to secure $25,000 fr the wreck, on two promissory notes, which seems adding insult to inju Principal production of the mine apparently was distributed as samples, so of which reached the Copper Handbook, but did not secure for the compa the favorable rating that it implored and demanded, by turns. Property co sidered worthless, and present equipment valuable only for scrap.

AMADOR COPPER & GOLD MINING & MILLING CO. MONTAN

Office: 507-172 Washington St., Chicago, Ills. Mine office: Iron Mounta Missoula Co., Mont. D. E. McKinnon, secretary and general manager. Orga

der laws of Arizona, with capitalization $2,000,000, shares $1 par. tock issue is held by Amador Consolidated Mining & Development Co., s hopelessly bankrupt. Lands, 18 claims, area 355 acres, also 2 groups nted placer gold claims, area 180 acres, and 450 acres miscellaneous laimed to show 5 fissure veins in slate and quartzite. The alleged mine cribed at length in Vol. VI, under title Amador Consolidated Mining & ment Co., with explanation that information as to large ore bodies solely on the statements of the company. Mine has a 600′ vertical vith about one mile of workings, and was claimed by McKinnon to have ,000 worth of ore blocked out, which was a lie. As a matter of fact, e shows a small chute of fair grade ore on the 200′ level, ore occurring ll bunches, very irregularly, with calcite gangue, in black slate. Mine 2-mile flume and pipe-line, delivering water under a 310′ head. Has power, with air-compressor, two hoists, sawmill, about 15 mine buildings 10-mile railroad, built at a cost of circa $160,000. Production was five ls of ore, which did not pay for treating charges.

OR SMELTING CO. **MONTANA.**

ffice: 507-172 Washington St., Chicago, Ills. Mine office: Amador, Mis- Co., Mont. D. E. McKinnon, general manager. Is controlled, through ownership, by Amador Consolidated Mining & Development Co., which is upt. Property is a 60-ton pyritic smelter, which treated, from the Amador five carloads of ore that did not pay treatment charges. Smelter con- d valuable mainly for junk.

LGAMATED COPPER CO. **MONTANA.**

Office: 42 Broadway, New York. Henry H. Rogers, president; Benj. B. r, assistant to the president; F. P. Addicks, vice-president; John D. Ryan, ging director; preceding officers, Albert C. Burrage, W. M. Rockefeller, . Rogers, Jr., Fred P. Olcott, Anson R. Flower, John Bushnell and Geo. H. h, directors; A. H. Melin, secretary and treasurer; John Gillie, general ntendent. Organized Apr. 27, 1899, under laws of New Jersey, with alization $75,000,000, increased, 1901, to $155,000,000, shares $100 par. al Trust Company of New York and National Shawmut Bank of Boston, trars. National City Bank of New York, and Kidder, Peabody & Co., of n, transfer agents. Annual meeting, first Monday in June.

The Amalgamated is a securities holding corporation, not a mining com- with assets consisting mainly of share interests in sundry subsidiary anies. Stock of the following named corporations is entirely owned by malgamated, with the exception of the few founders' shares, required to the names of directors: Washoe Copper Co., capitalization $5,000,000; do Smelting & Mining Co., capitalization $2,500,000; Diamond Coal & Co., capitalization $1,500,000; Big Blackfoot Milling Co., capitalization 00. In the following named corporations the Amalgamated holds from ally the entire issue, as in the case of the Boston & Montana, to a ty interest only, as in the Anaconda: Boston & Montana Consolidated & Silver Mining Co., capitalization $3,750,000; Parrot Silver & Copper pitalization $3,000,000; Butte & Boston Consolidated Mining Co., capitali $2,000,000; Anaconda Copper Mining Co., capitalization $30,000,000. malgamated also is credited with owning a controlling interest in the Metals Selling Co., but in all likelihood the control is held by Amalga- officers, rather than by the company. Miscellaneous holdings of the mated include 27,000 acres of timber lands; a large stock interest in te, Anaconda & Pacific R. R. Co.; the Republic Sampling Works, at a sawmill at Ravalli, Hamilton county, Montana; hotels at Anaconda milton; business blocks in Butte and Anaconda, and several daily ers. The company has about 21,000 shareholders.

Of the total capitalization of $155,000,000, the amount issued is $153,88
Net income for fiscal year ending Apr. 30, 1907, was $14,154,400, or $
on the stock, and for year ending Apr. 30, 1908, was $6,680,557, or 4.3
which time the surplus was $12,008,823. The available resources of the
pany, however, are larger than shown by these figures, for the reason tha
subsidiary corporations are exceptionally well fortified, both with cash res
and quick assets. Among the assets of the company is a loan of $7,20
made to the Washoe Copper Co., for building a smelter. Dividends have
as follows: 2% in 1899; 8% in 1900; 7½% in 1901; 2½% in 1902; 2% in
2% in 1904; 4½% in 1905; 6¾% in 1906; 7% in 1907; 2% in 1908, a to
44½% for 10 years, an average of slightly under 4½% per annum.

The subsidiary mines and other enterprises of the Amalgamated em
about 13,000 men, mainly at Butte, Anaconda and Great Falls, Montana,
an annual payroll of approximately $15,000,000. A 5-year contract
employes was made, early 1907, under which wages were automatically re
at the time of the depression in the copper trade, but will be automat
raised when copper again reaches a high price. Labor conditions are h
nious and satisfactory to both employer and employes.

The Amalgamated was organized in 1899 with the intention of contr
the copper industry of the world, but the debacle of 1901 proved that the
gamated was a long ways from being in control of the copper industry o
world, or even of the United States, though much the largest single fact
that industry. The material progress made by the Amalgamated has
especially notable since 1904, when John D. Ryan became managing dir
The production of copper by companies owned or controlled by the Am
mated was about 252,000,000 lbs. in 1904; 268,000,000 lbs. in 1905, and
275,000,000 lbs. in 1906, the direct share of the Amalgamated in the product
1906 being about 225,000,000 lbs., while for 1907 the Amalgamated share of c
output by companies owned or controlled was about 175,000,000 lbs., out
total of about 215,000,000 lbs. produced. This copper was secured at an av
cost of probably about 10.5 cents per pound, but somewhat cheaper c
should be made in the future, by reason of numerous economies and gr
improved conditions. The subsidiary corporations are in good condition
cially, and their mines, with few exceptions, are in fine shape physically
Anaconda and Boston & Montana being especially notable in the latter re
The long and disastrous litigation with F. Augustus Heinze was settle
1906, through the interposition of Mr. Ryan, by the formation of the
Coalition Mining Co., the organization of which brought relief from the in
able conditions that had prevailed for years. The litigation in whic
company was concerned has been cleared off the dockets of the courts,
the Amalgamated, instead of being engaged in more lawsuits than any
great company, now has fewer suits in the courts than almost any other
corporation of the United States. Mr. Ryan has proven himself an orga
and harmonizer of the highest ability, and in the course of a few years
secured the hearty good-will of almost everyone connected with the co
industry of Montana, either as an employe or competitor of the Amalgam
The company again followed, in 1907, its mistaken policy of "holding
umbrella" over the copper market for the benefit of its competitors, the
repeating, though on a less serious scale, the mistake of 1901. The fina
position of the company is strong, the general management has learned a g
deal about the copper industry in a decade, and the local management in B
is as effective and as good as that enjoyed by any copper property of the wo

AMALGAMATED COPPER MINING CO. UT

Office: care of Dr. C. E. Watkins, Boston, Mass. Letter returned
claimed from former mine office, Tremonton, Box Elder Co., Utah.

AMALGAMATED COPPER MINING & EXTRACTION CO. **WYOMING.**

Office: 1515 Larimer St., Denver, Colo. Mine office: Hecla, Laramie Co., Wyo. Louis Williams, president; Alonzo Hastings, vice-president; Henry Schwartz, secretary and treasurer. Organized under laws of Wyoming, with capitalization $1,000,000, shares 50 cents par. Lands, 11 claims, area 220 acres, in the Silver Crown district, 2 miles from the Union Pacific railway and 25 miles from Cheyenne, having about 700′ of workings, showing ore giving fair assays in copper. Company is in debt and property idle.

AMALGAMATED GOLD & COPPER CO. **ARIZONA.**

Dead. A swindle, promoted by Douglas, Lacey & Co., of 66 Broadway, New York, N. Y. See Douglas, Lacey & Co. Formerly at Huron, Yavapai Co., Ariz. Fully described Vol. VI.

AMALGAMATED GREENWATER COPPER CO. **CALIFORNIA.**

Office: 501-1524 Chestnut St., Philadelphia, Pa. Letter returned unclaimed from former mine office, Greenwater, Inyo Co., Cal. Was promoted, April, 1907, by Edward H. Worne & Co., who were organizing a syndicate, with intention of incorporating later, on 4 claims, said to be in the Greenwater district. Apparently somewhat diaphanous.

AMALGAMATED METAL & EXPLORATION CO. **ARIZONA.**

Letter returned unclaimed from mine office, Jerome, Yavapai Co., Ariz. J. M. Layman, secretary and general manager; Rudolph Rothermel, superintendent. Lands are said to include coal and oil areas in Utah, metalliferous claims in northern California and Oregon, and the Hogback group of 8 claims, adjoining the Verde Queen on the southwest and touching the Florencia claim of the United Verde. The Hogback has a 300′ tunnel and a 105′ shaft, said to show a little high grade ore. Company said to plan sinking a two-compartment shaft.

AMALGAMATED NEVADA MINES & POWER CO. **NEVADA.**

Office: 1131-52 Broadway, New York, N. Y. Operating office: Salt Lake City, Utah. Mine office: Black Horse, White Pine Co., Ely, Nev. Wm. Johnson, president; John I. Mathias, vice-president; Merrill A. Smith, secretary; Chas. N. Prouty, treasurer; Grant Snyder, general manager. Capitalization $10,000,000, shares $5 par. International Trust Co., Boston, transfer agent. Lands, 56 claims, also 1,000 acres of placer ground, 5,000 acres of ranch lands and water rights for the district, circa 35 miles east of Ely. Assays show values mainly in gold and silver. Is said to plan a 20-stamp custom mill.

BEWERKSCHAFT VEREIN AMALIA- UND KNOTTENBERG. **GERMANY.**

Letter returned unclaimed from former mine office, Mornshausen an der Dautphe, Hessen-Nassau, Germany. Adolph Freund, president. Capitalization, 1,000,000 marks. Has cupriferous silver-lead ores, opened by one shaft.

AMARILLO MINING CO. **NEW MEXICO.**

Office: care of Guy W. Holbrook, president, Lowell, Mass. Mine office: Amarilla, Otero Co., N. M. Dr. Warren W. C. Spencer, secretary. Lands, 13 claims, having about 5,000′ of openings.

AMATOLA COPPER CO. **TRANSVAAL.**

Mine office: Zoutpansberg, Transvaal. Has copper claims near the Messina Extension and Caledon mines, in the Zoutpansberg district.

AMAZON-BUTTE COPPER CO. **MONTANA.**

Office and mine: Forbis Blk., Butte, Silver Bow Co., Mont. A. H. Barrett, president; Jos. Lynch, vice-president; Chas. Mattison, secretary and treasurer; John Hewett, superintendent. Organized circa November, 1906, under laws of Montana, with capitalization $2,500,000, shares $5 par. Owners of lands took $1,500,000 in stock in full payment for property, giving them control of company. Stock was made assessable later, and a small assessment was levied October, 1907. Lands, 9 claims, 7 fractional, area 128 acres,

patented, in 2 groups, lying circa 2 miles east of the center of Butte
arated by the Ida-Montana, Butte & Summit Valley and Calumet
Lands include the Amazon, Gaynor and West Altoona claims at t
of Horse Cañon, in the southeastern part of Butte, about a quarter n
of the Bullwhacker and carrying more than 1,000′ of the north
fault veins of the latter. Lands also carry about 1,600′ of the east
vein of the Ida-Montana and 3 other veins, 2 veins being of fair pr
Amazon and Altoona claims giving a good showing from slight dev
Has a 436′ two-compartment shaft, with crosscuts and drifts on the
In 1907 nine sets of leasers were working the Bullwhacker vein on th
claim, and shipping about 50 tons of ore daily. Ore, as developed
copyrite, about 4′ giving average assays of 7% copper. Equipment
several permanent mine buildings, two 100-h. p. and one 250-h. p
4-drill air compressor and hoist. Production was begun circa Novem
and shipments to end of July, 1907, were 1,835 tons of ore, giving
returns of 2.72% copper and 0.01% silver, without gold values.

AMAZON COPPER MINING CO. CALI

Letters returned unclaimed from former office, 203 Fay Bldg., Los
Cal., and former mine office, Victorville, San Bernardino Co., Cal. C.
secretary. Capitalization, $1,000,000. Lands, 12 claims, area 240
miles from Victorville, in the Copper Mountain district, showing
ore giving assays of 4.5 to 21.5% copper, with small gold and silv

AMAZON GOLD CO.

Office: 107 Commercial Bldg., St. Louis, Mo. Mine office:
Tamazula, Durango, Mex. Jas. T. Dugan, president; Edward B. Sow
ager; J. S. Wilkinson, superintendent. Mine, known as the Candel
auriferous, argentiferous and bismuthiferous copper ores. Equipment
a Bryan mill, 6-ton chlorination plant and 100-ton smelter. Emplo
100 men, at last accounts.

AMAZON GOLD MINING CO.

Mine office: Culiacán, Sinaloa, Mex. Has gold, silver and cop
with steam power, employing circa 40 men, at last accounts.

AMERICA-BRITANNIA MINING CO. WASH

Dead. Formerly at Baring, King Co., Wash.

AMERICAN & CANADIAN MINING CO. BRITISH COL

Office: care of M. G. Scribner, general manager, Oakland, Ca
office: Tyee, Vancouver Island, B. C. Organized 1907.

AMERICAN CONSOLIDATED COPPER CO. MO

Office: 60 State St., Boston, Mass. Mine office: Butte, Silver
Mont. Larkin T. Trull, president; Hiram M. Burton, vice-president;
E. Hopkins, treasurer; David W. Snow, secretary; Jos. A. Coram,
Organized Jan. 12, 1906, under laws of Maine, with capitalization $65
later increased to $150,000,000, shares $100 par. Was organized to m
copper lands of the Davis and Daly estates, later organized as the Da
Estates Copper Co., the Balaklala, and various other properties. Capit
is ridiculously high and company apparently is abortive. Is regarded
ably.

AMERICAN CONSOLIDATED COPPER CO. NEW M

Dead. Formerly at Santa Fé, Santa Fé Co., N. M. Fully describe

AMERICAN CONSOLIDATED COPPER CO.

Offices: First National Bank Bldg., Chicago, Ills., and McCorni
Bldg., Salt Lake City, Utah. Mine office: Brighton, Salt Lake C
John C. Barnard, president; E. J. Darst, vice-president; Wm. Darst,
and treasurer; preceding officers, John Branborg and Jas. W. Sibley,

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2% copper,
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ARIZONA.
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ARIZONA.
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ARIZONA.
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WYOMING.
VI.
COLORADO.
ay, Ouray Co.,

NEW MEXICO.

Bldg., Chicago,
president; John
tendent. Lands
of copper, gold,
mill and 50-ton
tion early 1908,

UTAH.
Bingham Canyon,
connected with
is owned jointly
latter to furnish
has been done.

S. A. & MEXICO.
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r and St. Louis.
Ltd., of London;
nkfurt am Main;
Co., of Newark,
Mexico. Is an

NEW MEXICO.
s, N. M. Mine
rintendent. Or
tion $1,000,000.
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MEXICO.
, Durango, Mex.
John W. Martin,
laws of South

general manager. Organized 1885, under laws of New York, with capitalization $500,000, shares $1 par. Lands are mining rights to about 1,000 acres, and a 50-acre millsite owned in fee, on Watchung Mountain, circa 2½ miles from Somerville. Ore occurs as blanket veins between trap and shale, these having an average thickness of 2′ and being traceable nearly 4 miles, carrying an estimated average of 2.3% copper, with small gold and silver values. The oxidized zone shows crysocalla nearest surface, succeeded by oxides and carbonates, with chalcocite at greater depth, succeeded at circa 700′ depth by native copper that is both auriferous and argentiferous. The largest mass of native copper secured weighed about 100 lbs. Mine is opened by 3 inclines, of 155′, 450′, and 1,300′, and by a 500′ crosscut drainage tunnel. Has steam power, with 30-h. p. hoist, 5-drill Rand air-compressor and drills, tramway and necessary mine buildings. The 50-ton concentrator, of wood and stone, has 2 rolls, screens, crushers and 2 Wilfley tables. Product, when mine is operated, is turned out as concentrates, shipped to smelters on New York harbor. Idle for some years.

AMERICAN COPPER MINING CO.

Dead. John Baker, former president and general manager, reports company dead. Location of property never learned.

AMERICAN COPPER MINING CO.

Dead. A stock-jobbing outfit, formerly at 40 Wall street, New York. Promoted, on wind, by Ralph M. Jacoby, and others of his ilk.

AMERICAN COPPER & MINING CO. NEW MEXICO.

Office: St. Joseph, Mo. Mine office: Brice, Otero Co., N. M. Jas. C. Sager, president; J. J. Metcalf, secretary. Capitalization $1,000,000, shares $1 par. Lands, 5 claims, area 100 acres, known as the Badger group, on Granite Mountain, 4 miles from Orogrande smelter, showing a 20′ ore body and 4 smaller veins, opened by 5 shafts, deepest 140′. Has secured assays up to 12% copper and $7.20 gold per ton.

AMERICAN COPPER MINING & EXTRACTION CO. COLORADO.

Letter returned unclaimed from former office, 623 St. James Bldg., New York, N. Y. Property was the Gardiner leaching process. Presumably dead.

AMERICAN COPPER MINING & MILLING CO. UTAH.

Dead. Formerly at Simpson Springs, Utah.

AMERICAN COPPER MINING & SMELTING CO. NEW MEXICO.

Dead. Was a swindle, promoted by J. R. Kerr & Co., formerly at 555-11 Broadway, New York.

AMERICAN COPPER & SILVER CO.

Office: 15 Exchange Place, Jersey City, N. J. Organized February, 1907, under laws of New Jersey, by Geo. Melville Boynton, John R. Turner and B. S. Mantz, with capitalization $100,000. Location of lands, if any, unknown.

AMERICAN DEVELOPMENT CO. ARIZONA.

Dead. Merged, March, 1906, in American-Saginaw Development Co. Formerly at Bisbee, Cochise Co., Ariz.

AMERICAN EAGLE COPPER MINING CO. WYOMING.

Dead. Formerly at Encampment, Carbon Co., Wyo.

AMERICAN EAGLE MINING CO. CALIFORNIA.

Mine office: Needles, San Bernardino Co., Cal. H. H. Ahrens, superintendent. Lands are on Whipple Mountain, 10 miles west of the Colorado River and circa 40 miles south of Needles. Presumably idle.

AMERICAN FLAG MINING CO. UTAH.

Office: Salt Lake City, Utah. Mine office: Park City, Summit Co., Utah. Geo. H. Rotham, president; E. B. Palmer, secretary; John G. Rhodin, superintendent. Is said to plan a bond issue, not to exceed $150,000, to raise funds for a mill. Mine is developed principally on the 400′ to 1,100′ levels, work

on the bottom levels, hampered by water, showing a considerable tonnage of $15 to $16 milling ore. Ores are said to carry an average of about 2% copper, 5% lead and up to 60 oz. silver and $7.50 gold per ton. Has steam power. Unwatered mine, April, 1908.

AMERICAN GOLD & COPPER CO. **ARIZONA.**

Office and mine: Globe, Gila Co., Ariz. O. W. Thompson, director. Organized June 20, 1907, under laws of Arizona, with capitalization $500,000, shares $1 par.

AMERICAN GOLD & COPPER CO. **ARIZONA.**

Dead. Was merged, 1904, in the Poland-American Gold Mining & Milling Co. Formerly at Morristown, Maricopa Co., Ariz. Described Vol. VI.

AMERICAN GOLD & COPPER CO.

Office: 951 Tremont Bldg., Boston, Mass. Location of lands, if any, unknown.

AMERICAN GOLD & COPPER CONSOLIDATED MINING CO. **ARIZONA.**

A tentative reorganization, circa 1905, of the American Copper Co., of Yavapai county, Arizona. Apparently abortive.

AMERICAN GOLD & COPPER MINING CO. **WYOMING.**

Dead. Formerly at Jelm, Albany Co., Wyo. Described Vol. VI.

AMERICAN GOLD MINING CO. **COLORADO.**

Office: 304-411 Olive St., St. Louis, Mo. Mine office: Ouray, Ouray Co., Colo. Fully described Vol. VI.

AMERICAN GOLD MINING COMPANY OF NEW MEXICO. **NEW MEXICO.**

Letter returned unclaimed from former office, 312 Tacoma Bldg., Chicago, Ills. Mine office: Nogal, Lincoln Co., N. M. A. T. Anderson, president; John Monk, secretary; J. M. Rice, manager; M. D. Gaylord, superintendent. Lands include the American, Helen and Old Abe mines, carrying ores of copper, gold, silver and lead. Has steam and electric power, 50-stamp mill and 50-ton cyanide plant. In litigation several years. Planned resumption early 1908, but apparently remains idle.

AMERICAN GULCH MINING CO. **UTAH.**

Office: 53 Tremont St., Boston, Mass. Mine office: Bingham Canyon, Salt Lake Co., Utah. Organized, 1906, by interests closely connected with the Utah-Apex, to build a 200-ton mill at Bingham. Control is owned jointly by the Utah-Apex Mining Co. and Utah Development Co., latter to furnish site and former the cash. Cannot be learned that any work has been done.

AMERICAN METAL CO., LTD. **U. S. A. & MEXICO.**

Office: 52 Broadway, New York, N. Y. Mexican office: 3 Calle de San Augustin, Mexico, D. F. Also has branch offices in Denver and St. Louis. Company is American agent for Henry R. Merton & Co., Ltd., of London; Metallegesellschaft und Metallurgische Gesellschaft, of Frankfurt am Main; Societe le Nickel, of Paris, and Balbach Smelting & Refining Co., of Newark, N. J. Controls the Compañía de Minerales y Metales, of Mexico. Is an extensive dealer in metals, largely copper.

AMERICAN METALS CO. **NEW MEXICO.**

Letter returned unclaimed from former office, Las Cruces, N. M. Mine office: Organ, Donna Ana Co., N. M. Emil A. Franke, superintendent. Organized 1905, under laws of New Mexico, with capitalization $1,000,000. Property is the Modoc mine, having a mill with 3 Wilfley tables and 2 vanners.

AMERICAN-MEXICO MINING & DEVELOPING CO. **MEXICO.**

Office: Watertown, S. D. Mine office: Velardeña, Cuencamé, Durango, Mex. W. A. Merrifield, president; A. L. Selenberger, vice-president; John W. Martin, secretary; F. O. Smolt, general manager. Organized 1902, under laws of South

Dakota, with capitalization $3,000,000, shares $1 par. Company, in 1906, r ported $1,267,544 stock issued, and in 1908 reports $857,550 stock issued. H authorized $50,000 bonds at 6%. Dividends paid, though unearned, cir $387,500. Lands, 21 claims, area 110 hectares, with 49 hectares in millsit and 300 hectares miscellaneous lands, including La Roca Negra, Tecolotes a Los Libres mines. La Roca Negra mine has a 400′ shaft; Los Libres mine 134′ shaft and 34′ tunnel, and the Tecolotes mine has a 160′ shaft and 3 tunnel. La Roca Negra mine, sometimes called La Victoria, area 10 hectar bought for $60,000, is a good small mine, having 3 veins averaging 3″ to width only, and not 3 metres, as claimed by company. Equipment includes 180-h. p. steam plant, with 3 hoists.

Smelter, at San Lorenzo, 4 to 8 miles from the mines, has 2 bl furnaces, with 80 to 150 tons daily capacity. The company's claim of production of 261,531 lbs. fine copper in 1904 was questioned by the Copp Handbook. The suspicions plainly stated in past editions have been verifi by disclosures in 1908, leading to indictments against the former officers, i cluding Dr. W. S. Phillips, who seems to have been the chief scoundr Property, under former management, was a deliberate swindle, but La Ro Negra mine, though small, has good ore, and possibly, under honest manag ment, the shareholders may recover something from the wreck.

AMERICAN MINES DEVELOPING ASSOCIATION. **CALIFORNI**

Office: 610 South Spring St., Los Angeles, Cal. Letter returned u claimed from former mine office, Needles, San Bernardino Co., Cal.

AMERICAN MINES DEVELOPMENT CO., LTD. **ARIZON**

Office: 506 Oneida Bldg., Minneapolis, Minn. P. R. Bailey, presiden Jas. T. Manning, secretary and treasurer. Capitalization $10,000,000, shar $1 par. Lands are claimed to be zinc property in Searcy county, Arkansa 14 copper claims 16 miles west of Globe, Gila county, Arizona; 2 miles placer claims on the Snake River, Idaho; 2 gold quartz claims in easte Oregon; 2 gold claims in the Cripple Creek district of Colorado and 5 sectio of oil lands in California. Capitalization is excessive, plan of operatio nonsensical, and company apparently was promoted to sell stock.

AMERICAN MINES & EXPLORATION CO. **ARIZON**

Mine office: Hillside, Yavapai Co., Ariz.

AMERICAN MINING CO. **ARIZON**

Mine office: Globe, Gila Co., Ariz. Mine, near the Gibson, has a 3 shaft. Lands said to have been leased, 1908, to Amos Green and John Rys

AMERICAN MINING CO. **IDAH**

Office: Helena, Mont. Letter returned unclaimed from former mi office, Weiser, Washington Co., Idaho. Property was the Peacock mine, the Seven Devils district.

AMERICAN MINING CO. **MEXIC**

Dead. Lands sold, 1906, to Cananea Central Copper Co. Formerly La Cananea, Arizpe, Sonora, Mex. Described Vol. VI.

AMERICAN MINING CO. **MICHIGA**

Office: care of John W. Kingston, receiver, Calumet, Mich. To Dec. 1871, company had levied assessments of $21,000. Company was form originally by setting off 1,100 acres from the Cliff mine. Present lands a circa 500 acres, in Keweenaw county, Michigan. Company is being liquidate

AMERICAN MINING & DEVELOPMENT CO. **CALIFORNI**

Letter returned unclaimed from former office, Omaha, Neb. Mine office French Corral, Nevada Co., Cal.; Kennett, Shasta Co., Cal., and Marysvil Yuba Co., Cal. T. F. Warden, general superintendent. Is supposed to controlled by the American Smelting & Refining Co. The Red Ledge min in Nevada county, carries copper ore and has steam and water power. T

property in Yuba county, at Sweetland, 20 miles east of Marysville, shows a considerable body of auriferous copper ore.

AMERICAN MINING & DEVELOPMENT CO. **MEXICO.**

Office: Bisbee, Ariz. Mine office: Naco, Arizpe, Sonora, Mex. Lands are a few miles south of Naco. Owing to quarrels among shareholders, attended by litigation, company is practically moribund.

AMERICAN MINING, MILLING & SMELTING CO.

Dead. Was a brazen swindle, owning no property whatever, with office at 10 Coleman St., London, E. C., England, and was fully exposed in Volumes V. and VI. As a result of the efforts of the Copper Handbook this gang of swindlers was brought to book in 1906, and, as surmised, company was found to possess no lands, no officers and no organization, hence it is unnecessary to repeat the names of the alleged officers in quotation marks, as was done in the last two editions of this work. It was stated in Vol. VI. of the Copper Handbook that every man connected with this company was either a fool or a rascal, and this statement was verified at the trial, when Henry Jonas, the fool, was given 18 months in prison, and Mark Anthony Youngs, the rascal, was given 10 years penal servitude.

Sir Harry Marks, owner of the London Financial News, who had puffed this rotten swindle extensively, was sufficiently alarmed, when requested by the Copper Handbook to explain his action in the premises, to engage the services, as solicitor, of Sir George Lewis, a lawyer noted in England for his ability to keep clients out of jail, and for his profound and intricate knowledge of the swindles and scandals of the past forty years. Sir Harry and Sir George jointly repelled, "with scorn," the idea that there was anything to explain in connection with the puffery by the Financial News of this deliberate swindle, and a satisfactory explanation of the attitude of the Financial News remains to be made—if such an explanation is possible.

Another party, the editor of a financial weekly in London, who had viciously attacked the Copper Handbook as a blackmailing enterprise, because of its exposure of the American Mining, Milling & Smelting Co., and who had strongly endorsed the latter, became so alarmed over the pointed questions of the Copper Handbook, after the conviction of Messrs. Jonas and Youngs, that he took refuge in nervous prostration and sold his newspaper, inducing the new proprietor to beg him off, thus saving his precious bacon. Readers of the London Financial News and other publications of like ilk should bear in mind that the reports on companies, printed in their columns, almost invariably are furnished by the companies themselves, or that the report is submitted to the companies before printed, for "editing," and that, in practically every case, the reports of company meetings and other matters of similar nature, are paid for, in hard cash, at tremendously high advertising rates. The true value of this sort of "news" is too obvious to require comment.

AMERICAN PROSPECTING & DEVELOPMENT CO. **ARIZONA.**

Office: Bisbee, Ariz. Mine office: Jerome, Yavapai Co., Ariz. Lands are sundry claims adjoining the Equator mine, having a 43' shaft, with a 112' drift in ore. Presumably idle.

AMERICAN-SAGINAW DEVELOPMENT CO. **ARIZONA.**

Office: 510 Lyceum Bldg., Duluth, Minn. Mine office: Bisbee, Cochise Co., Ariz. Thos. H. Collins, president; Chas. d'Autremont, Jr., vice-president; Frederick R. Kennedy, secretary; Wm. G. Haggart, treasurer; preceding officers, Henry B. Hovland, Wm. B. Mershon and Watts S. Humphrey, directors; L. W. Powell, general manager. Organized March 7, 1906, with capitalization $1,000,000, shares $10 par, $6 paid in, as a merger of the American Development Co. and Saginaw Development Co. Lands are 26 claims, owned outright,

being the American group of 9 claims, lying next east of the Jun the Saginaw group of 17 claims, area 297 acres, also favorably loc and the Muheim and World's Fair groups. Mine has an old 384' shaft, at an angle of 70° with the horizon, showing 35' of leached ore on the level, and a new 1,100' three-compartment shaft connected with the I Arizona, which cut a 35' body of low-grade ore on the 350' level. A co erable body of leached ore was found on the 750' level of the Saginaw, prospects of commercial ore at greater depth. The Saginaw shaft has a do drum first-motion hoist, with capacity for raising 4-ton skips 1,400', and has a good pumping equipment. Management is excellent and proper well located. Idle since September, 1907.

AMERICAN SMELTERS EXPLORATION CO. **U. S. A. & MEX**

Dead. Organized 1905, title changed to American Smelters Securitie

AMERICAN SMELTERS SECURITIES CO. **U. S. A. & MEX**

Office: 71 Broadway, New York. Daniel Guggenheim, president; B Sewell, Silas W. Eccles, G. F. Hilton, Eugene B. Borden and Edward B vice-presidents; W. E. Merriss, secretary; Morris Guggenheim, treasurer S. Morse, assistant manager; W. C. Potter, Mexican manager; William R. business manager; Alfred von der Ropp, metallurgical superintendent. ganized March 25, 1905, under laws of New Jersey, as American Smelter ploration Co.; name changed to present title May, 1905. Capitaliz $77,000,000, shares $100 par, divided into $17,000,000 Series A cumulative preferred stock; $30,000,000 Series B cumulative preferred stock at 5%, $30,000,000 common stock. Series A has preference as to dividends, and preference series have equal rights as to assets, both having priority common stock. The American Smelters Securities Co. is controlled by American Smelting & Refining Co., through ownership of a majority o issue of common stock, and the American Smelting & Refining Co. guara the Series B. preferred stock. First quarterly dividend was paid July, on Series A. Surplus, May 31, 1907, was $1,016,744. Morton Trust Co. istrar. Annual meeting, first Wednesday in September.

The American Smelters Securities Co. is merely a subsidiary corpo of the American Smelting & Refining Co., and, in turn, is merely a secu holding company, controlling, through ownership of shares, or otherw number of smaller corporations. It also is closely affiliated with the Gu heim Exploration Co. The various corporations and the principal mines trolled are as follows:

Balaklala Consolidated Copper Co., Coram, Cal.
Dairy Farm Mining Co., Van Trent, Cal.
Selby Smelting & Lead Co., Selby, Cal.
A. Y. & Minnie Mining & Milling Co., Leadville, Colo.
Silver Lake Mines, Silverton, Colo.
United States Zinc Co., Pueblo, Colo.
Western Mining Co., Leadville, Colo.
Federal Mining & Smelting Co., Wallace, Idaho.
Federal Lead Co., Federal, Ills.
Central Lead Co., Flat River, Mo.
Federal Lead Co., Flat River, Mo.
Cumberland-Ely Copper Co., Ely, Nev.
Nevada Consolidated Copper Co., Ely, Nev.
Steptoe Valley Mining & Smelting Co., Ely, Nev.
Garfield Smelting Co., Garfield, Utah.
Utah Copper Co., Bingham, Utah.
Puget Sound Reduction Works, Everett, Wash.
Tacoma Smelting Co., Tacoma, Wash.

Monte Cristo Mining & Concentrating Co., Monte Cristo, Wash.
Bonanza Mines, Bonanza, Zacatecas, Mex.
Botello Mines, Parral, Chihuahua, Mex.
Dolores Mines, Matehuala, San Luis Potosí, Mex.
Jibosa Mines, Jiménez, Chihuahua, Mex.
Reforma Mines, Reforma, Coahuila, Mex.
Tecolotes Mines, Santa Barbara, Chihuahua, Mex.
Tepezalanes Mines, Tepezalá, Aguascalientes, Mex.
Velardeña Mining & Smelting Co., Velardeña, Durango, Mex.

AMERICAN SMELTING & REFINING CO. U. S. A. & MEXICO.

Office: 71 Broadway, New York, N. Y. Works offices: At numerous addresses, given hereinafter. Daniel Guggenheim, president; Barton Sewell, vice-president; Edw. Brush, vice-president and assistant to the president; Silas W. Eccles, vice-president in charge of mine and mills; W. E. Merriss, secretary; Isaac Guggenheim, treasurer; L. A. Chapin, assistant treasurer; F. W. Hills, comptroller; Judd Stewart, general auditor and general superintendent; J. K. MacGowan, purchasing agent; Wm. Sproule, traffic manager; Geo. C. Kaufman, manager mining department; Franklin Guiterman, general manager Colorado department; C. W. Whitley, general manager Utah department; W. C. Potter, general manager Mexican department; S. R. Guggenheim, chairman executive committee; Morris Guggenheim, chairman finance committee; Edw. Brush, Silas W. Eccles, Anton Eilers, Karl Eilers, Daniel Guggenheim, Isaac Guggenheim, Morris Guggenheim, M. R. Guggenheim, F. W. Hills, J. K. MacGowan, W. S. Morse, E. L. Newhouse, Grant B. Schley, Barton Sewell, Wm. Sproule, J. N. Steele, Judd Stewart, J. P. Grant, Franklin Guiterman, Dennis Sheehy, Jos. Clendenin, Solomon Guggenheim, W. S. McCornick and W. F. Thatcher, directors.

Organized Apr. 4, 1899, under laws of New Jersey, with capitalization $54,600,000, later increased to $100,000,000, shares $100 par, in $50,000,000 cumulative 7% preferred and $50,000,000 common stock. Annual meeting, first Wednesday in September. Chase National Bank, New York, registrar; Chas. E. Beach, treasurer for agent. Dividends on common stock have been as follows: 5% in 1904; 5½% in 1905; 7% in 1906; 7½% in 1907; 2% January and 1% April and July each, 1908. Net earnings have been as follows: $1,579,907.85 in 1900; $3,828,441.27 in 1901; $4,861,619.01 in 1902; $7,576,785.57 in 1903; $7,905,572.84 in 1904; $8,898,811.36 in 1905; $10,161,358.12 in 1906; $11,508,669.20 in 1907. Company controls the American Smelters Securities Co. which is a subsidiary corporation, through ownership of $17,751,000 of the common stock issue of $30,000,000, and owns 25,000 shares, par value $2,500,000, of Series B, preferred stock, of the same company, bought for $1,202,270, and has guaranteed 5% dividends on the entire stock issue of Series B, preferred stock. Company's surplus, at end of fiscal year, Apr. 30, 1907, was $13,397,028.12, not including $17,751,000 of common stock of the American Smelters Securities Co.

Following is the list of operating plants of the company:
Perth Amboy plant, Maurer, N. J., copper and lead and lead smelting.
National plant, South Chicago, Ills., lead refinery.
Omaha plant, Omaha, Neb., lead refinery, copper smelting and converting.
Globe plant, Denver, Colo., lead smelting.
Pueblo plant, Pueblo, Colo., lead smelting.
Eilers plant, Pueblo, Colo., lead smelting.
Durango plant, Durango, Colo., lead smelting.
Arkansas Valley plant, Leadville, Colo., lead smelting.
Murray plant, Murray, Utah, lead smelting.
Garfield plant, Garfield, Utah, copper smelting.

Selby plant, Selby, Cal., lead smelting and lead refinery.
Tacoma plant, Tacoma, Wash., lead and copper smelting.
Everett plant, Everett, Wash., lead smelting and arsenic refinery.
Helena plant, East Helena, Mont., lead smelting.
El Paso plant, El Paso, Tex., lead and copper smelting.
Aguascalientes plant, Aguascalientes, Mex., lead and copper smelting.
Monterey plant, Monterey, Mex., lead smelting.
Velardeña plant, Velardeña, Mex., lead and copper smelting.
Chihuahua plant, Chihuahua, Mex., lead smelting.
Federal plant, Federal, Ills., lead smelting and refining.

In addition to the foregoing plants, the company has other extensive interests and is supposed to control the United States Zinc Co., of Pueblo, Colo., the Silver Lake Mines, Silverton & Western Mining Co., and Aspen Mining Co., of Silverton, Colo.; the Carbon Coal & Coke Co., of Trinidad, Colo.; the Cook's Peak Mines, of Cooks, N. M., and extensive mining interests in the leading mining states of Mexico. Unfortunately, the American Smelting & Refining Co., its subsidiary corporation, the American Smelters Securities Co., and its affiliated corporation, the Guggenheim Exploration Co., are so closely interlocked, and particulars furnished the public are so meagre, that it is almost impossible to state which properties are owned or controlled by any one of these three different dovetailing corporations.

In addition to the foregoing interests, the company owns the exclusive rights to the Huntington-Heberlein ore-roasting patents in the United States and Mexico, and maintains a profit-sharing fund for employes occupying positions of responsibility. The various smelting plants of the company and its affiliations have an annual capacity of probably about 6,000,000 tons of raw ore and concentrates. There also are various subsidiary corporations for ore purchasing and other purposes. Apparently the copper ores are handled mainly through the American Smelters Securities Co.

The Helena smelter, at East Helena, Mont., is of 600 tons daily capacity. Frank M. Smith, manager; C. C. Titus, assistant manager.

The Murray smelter, at Murray, Utah, is a very complete plant. A new feature at these works is a 100x216′ baghouse, which has 4,200 cotton bags, each 30′ long and 18″ in diameter, the cloth required being sufficient to cover 16 acres. There has been much trouble in the past from smelter fumes, but the baghouse, in addition to saving considerable values heretofore lost, has greatly reduced the volume of fumes.

The Arkansas Valley plant, at Leadville, Colo., handles mainly lead ores,

The old Grant smelter, at Denver, has been dismantled, and it is planned some years.
with a little copper. The other plants at Leadville have been dismantled for to sell the ground.

The El Paso smelter, at El Paso, Tex., F. C. Earle, manager, has 8 furnaces, with a daily capacity of circa 1,200 tons.

The Playa Blanca smelter, at Antofagasta, Chile, has been idle for some years, and the American Smelting & Refining Co. is no longer a factor in the South American metal industry.

The Aguascalientes smelter, at Aguascalientes, Mexico, Wm. J. Hamilton, superintendent, is a large plant of about 2,000 tons daily capacity, having 2 lead furnaces, 8 copper furnaces and 4 copper converters.

The Chihuahua smelter, at Chihuahua, Mexico, Geo. B. Squires, superintendent, is a new plant, rated at 625 tons daily capacity, having blast furnaces with buildings of steel and a 370′ brick stack, with inside diameter of 16′, 8 miles of railroad track, a hotel and 192 dwellings for workmen.

The Monterey smelter, at Monterey, Nuevo León, Mexico, Edward

Knight, manager, is of 1,200 tons daily capacity, having 10 blast furnaces and 15 reverberatory furnaces.

The principal refinery is the Guggenheim Works, at Perth Amboy, Middlesex Co., N. J., built 1895, and since repeatedly enlarged. This plant, having the advantages of tidewater frontage and rail connections at the rear, has copper and lead furnaces and a large electrolytic plant, also a bluestone plant making large quantities of copper sulphate. The electrolytic lead and copper refineries are each of about 125 tons daily capacity.

The Keyser refinery, at Baltimore, Md., was bought in 1907.

Copper production is merely an incident with the American Smelting & Refining Co., which is much the largest general smelting and metallurgical enterprise of the world. Copper production, 1905, was 72,952,000 lbs. fine copper; in 1906 was 85,810,000 lbs. fine copper, and in 1907 was 94,600,000 lbs. fine copper. It seems probable that an annual output of at least 150,000,000 lbs. fine copper will be reached within a few years.

AMERICAN VENTURE CO. **MEXICO.**

Office: care of Harry M. McIntosh, general manager, 77 Jackson Blvd., Chicago, Ills. Mine office: Ayutla, Autlán, Jalisco, Mex. Capitalization $200,000. Lands, 18 hectares, in the Bautista district, also copper and silver claims in the Cuautla and Ayutla districts, and one property in the Mascota district.

SOCIEDAD MINERA LA AMISTAD. **SPAIN.**

Office: San Antonio, 44, Granada, Spain. Mine office: Albuñuelas, Granada, Spain. Don Joaquin Marin Robles, president. Property is the Santa Ines mine, carrying copper and cobalt ores.

AMYGDALOID MINE. **MICHIGAN.**

Owned by Calumet & Hecla Mining Co. Described Vol. II.

ANACONDA CONSOLIDATED COPPER COMPANY OF GREENWATER. **CALIFORNIA.**

Office: care of Geo. F. von Polenz, secretary, Goldfield, Nev. Mine office: Greenwater, Inyo Co., Cal. W. R. Wheat, president; J. L. Kalfus, vice-president; preceding officers, H. T. Rudisell and W. D. Wilson, directors. Organized 1906, under laws of Arizona, with capitalization $1,000,000, shares $1 par. Lands, 7 claims, area 114 acres, circa 4 miles southwest of Greenwater, showing copper float. Idle.

ANACONDA CONSOLIDATED COPPER MINES & SMELTING WORKS. **AUSTRALIA.**

Dead. Property sold to Murrin Copper Mines, Ltd., and company liquidated.

ANACONDA COPPER MINING CO. **MONTANA.**

Office: 42 Broadway, New York, N. Y. Mine office: Butte, Silver Bow Co., Mont. Works office: Anaconda, Deer Lodge Co., Mont. John D. Ryan, president; Henry H. Rogers, vice-president; preceding officers, Wm. Rockefeller, J. E. Judson, E. C. Bogert, Geo. H. Church and Urban H. Broughton, directors; F. P. Addicks, treasurer; C. F. Kelley, secretary; A. H. Melin, assistant secretary; John Gillie, general superintendent; E. P. Mathewson, mill and smelter superintendent; D. W. Brunton, consulting engineer; J. P. O'Neill and Jas. Higgins, mine superintendents.

Organized June 18, 1895, under laws of Montana, with capitalization $30,000,000, shares $25 par, as successor of Anaconda Mining Co. Is controlled, through ownership of about 75% of stock, by Amalgamated Copper Co. Annual meeting, in May. National City Bank, New York, transfer agent. Stock is listed on the New York, Boston and London stock exchanges, and on the New York Consolidated stock exchange. Dividend coupons are payable in England by the London Joint Stock Bank, Ltd., Princes St., E. C. Warrants

to bearer are issued, in England, in denominations of 5, 20 and 50 shares. dends have been as follows: $4,800,000 in 1900; $3,900,000 in 1901; $1,20 in 1902; $1,200,000 in 1903; $1,200,000 in 1904; $2,400,000 in 1905; $5,85 in 1906; $7,800,000 in 1907, and for 1908, quarterly dividends of 2% were dividends for the year aggregating $2,400,000. Net earnings for 1907 $3,378,220.42, including $581,281.74 earned by various subsidiary corpora and departments outside of regular mining operations. Company's sur Dec. 31, 1907, was $6,261,462.30. Assets include investments of $534,1 in various subsidiary companies, and merchandise on hand, for sale, value $631,860.14.

Lands, 572 acres, constituting much the largest property in the B camp, and including the heart of Butte Hill. A detailed description of geology will be found in the article on Montana, in the chapter on Amer copper deposits. Miscellaneous real estate holdings include extensive tim lands and coal mines. The Anaconda is the largest copper producer of world and employs about 5,000 men, under normal conditions.

The Anaconda was opened, 1880, as a silver mine, but at about 150′ de the silver values decreased, being succeeded, a little lower, by high-gr copper ores, mainly chalcocite and bornite, while at depth there is a l amount of enargite. Net earnings of the mine, during the 15 years, 1880-1 are unknown, but may be estimated safely as not less than $50,000,000. a depth of about 1,600′ the mines of the Anaconda showed impoveris values, there being considerable marcasite, but an improvement was no at 1,800′ and 2,000′, and very rich ore has been found below 2,200′, w high-grade chalcocite is being mined at a depth of 2,800′ in the High mine of the Anaconda, this being the deepest level now worked in the Bu camp. The various mines of the Anaconda have immense reserves of of all grades from low to high, and a considerable number of stopes of hi grade ore remain untouched. The ores extracted from the various mines g an average return of about 65 lbs. of copper per short ton, or 3.25%, w about 2½ to 3 oz. silver and 35 cents gold per ton.

The Anaconda mine proper has a 3-compartment main shaft, 2,4 deep, timbered with 10x10″ square sets, with about 30 exits, being connec underground with the Never Sweat, St. Lawrence, Bell, Wild Bill, East G Rock, Buffalo and Mountain Consolidated mines. Ventilation normally good, but considerable trouble was had, 1908, with gases from the adjoin St. Lawrence mine, and it is probable that the fire has crept from the Lawrence into several of the upper levels of the Anaconda. The mine electric lights and signals, and electric locomotives for tramming were stalled, 1907, on several levels. Hoisting is by 8-ton skips, swung un double-deck cages and worked in counterbalance.

The Never Sweat mine has a 3-compartment 2,500′ main shaft, timbered, 1905, with false sets, allowing an 18″ play for squeeze. Square timbering is used, with back filling, and tramming is done by horses. mine has electric lights and bells, and is connected underground with Parrot, Colusa-Parrot and Moonlight mines. The surface plant includes 3,000-h. p. hoist with 30x72″ cylinders, raising 8-ton skips swung under doub deck cages. There are 5 Ingersoll-Sergeant air-compressors, 2 being elect cally driven, with aggregate capacity of 32,000 cubic feet of free air per mi ute, capable of running 360 power drills.

The St. Lawrence mine has a 3-compartment 2,400′ main shaft, wi 22 exits, being connected underground with the Anaconda, Never Swe Mountain View and Pennsylvania mines. The mine has electric lights a bells, and a chain system of endless-haulage on the 14th level. The St. La rence has been on fire since 1889, in an extensive area above the 1,100

fire has been fought constantly, and walled off by bulkheads wherever ible, but cannot be extinguished, and must be allowed to burn itself out, ugh it is possible to control its progress to a considerable extent. A com- e fire-fighting brigade is kept constantly on duty, working 8-hour shifts. ile the fire is troublesome, it does not result in the loss of copper, as the ered ore remaining after the burning of the sulphur can be mined later, the mine waters are strongly charged, carrying 9 to 13 lbs. copper per ton, ch of which is recovered by underground precipitation in concrete sumps, water leaving these sumps carrying only 2 to 4 lbs. of copper per ton, d again being leached on surface. The hoist has 32x72" cylinders, raising ton skips swung under double-deck cages.

The High Ore mine is the deepest in Butte, having a 3-compartment shaft 2,900' depth, with the lowest level at 2,800', producing high-grade chal- ite. Being the deepest mine of the group, the High Ore does the pumping r a number of connecting mines of the Anaconda and Amalgamated groups, ndling all water from the Anaconda, Washoe and Parrot properties. The ine has 7 powerful pumps, including 3 Dixon pumps on the 2,200' level, 2 mps on the 1,600' level and 3 on the 1,000' level. The mine has electric hts and bells, and tramming is done mainly by horses. Hoisting is done with o 3-deck cages.

The Diamond mine has a 3-compartment 2,200' shaft, from which hoisting done by a 32x72" Risdon engine, operating double-deck cages with 8-ton kips. The Diamond has a large compressor plant with 4 electric air-com- essors fitted with auxiliary steam cylinders, having an aggregate capacity 16,000 cubic feet of free air per minute.

The Mountain Consolidated mine has a 3-compartment 2,400' shaft, with 32x72" Union Iron Works hoist operating two 4-deck cages.

The Green Mountain mine has a 3-compartment 2,200' shaft.

The Modoc mine has a 1,000' shaft. The Modoc vein is the largest in tte, averaging about 100' in width, but is low in grade to the depth opened, ng ranging in tenor from 1.5 to 2% copper only, but should improve with pth, and is a property of much promise. A new gallows-frame and a 00-h. p. electric hoist were installed, 1908, when the mine was reopened.

The Bell mine has a 3-compartment 1,600' shaft, connected underground ith the Anaconda mine. Ore is trammed by mules and a 28x40" hoist raises uble-deck cages.

The Bell No. 4 mine, having a 365' shaft, is idle.

The Belmont mine has a 1,000' shaft, which was cut down, 1907, to 3-compartment size.

The Wild Bill mine, having a 2-compartment 400' shaft, is idle. The rface plant has been dismantled, and ore probably will be extracted through e shafts of adjoining mines.

The Ramsdell-Parrot mine has an 800' shaft, connected underground on e 400' and 500' levels with the Colusa mine, and is operated through the ver Sweat shaft.

The Gallatin mine has a 250' shaft.

The Monitor mine is connected underground with the J. I. C. and Ground quirrel mines.

In addition to the foregoing mines, there are several smaller properties, ainly idle, having more or less development, among the more important being e Sunnyside, J. I. C., Wake-Up-Jim and Buffalo.

The mine waters from the various shafts being highly charged with pper, an extensive leaching plant is operated in the gulch just above Meader- ille, where a large amount of cement copper is secured by precipitation. ld scrap iron, tin cans and wire rope are used as the precipitating agent,

these articles commanding a standard price of 1 cent per pound. T
the water in the precipitation tanks and launders is much more ra
the case in the large Spanish lixiviation plants.

Steam has been supplanted very largely by electric energy,
brought from a generating plant at Canyon Ferry, 70 miles distant,
adjoining hydro-electric installations in Broadwater county. The
wired to the mine with a primary voltage of 50,000, reduced to 2,0
a transformer station just outside of Butte, power being distribu
various workings from a main station at the Never Sweat mine.
dynamo furnishes motive power for a direct-current generator tha
an extensive underground haulage system actuated by compressed air
lights are used underground very extensively, being employed whe
sible, and a large number of minor motors at the various buildings
face plant are driven electrically by a 440-volt current. Electric
been found considerably cheaper than steam, both at the mines and

The Washoe reduction works are described hereinafter, althoug
in the name of the Washoe Copper Co., because treating mainly Ana
commonly known as the Anaconda smelter, and leased by the Anaco
Mining Co. The site of about 240 acres, on Washoe Hill, is about 2
of Anaconda and 28 miles by rail from Butte. The plant was d
Frank Klepetko and built and equipped with the able assistance
Mathewson, Repath and Gulberg, and the late R. C. Collins and Wm.
Ground was broken May, 1900, and smelting was begun February,
which time numerous modifications and improvements have brought
to a daily capacity of 11,000 tons of raw ore. In the construction o
there were required 20,000 tons of structural steel, 25,000,000′ of lu
carloads of brick, 50,000 cubic yards of masonry and 300,000 cubi
excavation. The cost of the plant has been about $9,500,000. The g
of exceptional neatness, and the plant, as a whole, is nearly ideal
construction and equipment. Being located upon the side of a
advantage is taken of gravity in the handling of material.

The concentration plant, covering 7 acres, includes a number of
The bins, of wood and steel, include 8 second-class ore storage bins of
capacity each, thirteen 200-ton sampling ore bins, and a 2,50
storage bin.

The sampling mill, 40x60′ in size and 6 stories high, is in 2 sec
of 1,800 tons daily capacity. Ore to be sampled is taken from sam
by an electric locomotive and dumped into the mill bins, whence
to crushers, crushed material being raised to the top of the building
elevators. The descending stream of ore is cut four times by Bru
matic samplers, each taking 20%, giving a final sample of 3.2 lbs. pe
of ore. Discard from the sampling mill is elevated and dumped int
centrator ore-bins, or, in the case of smelting ore, is sent to the bl
storage bins. The final sample is quartered by a Brunton quarteri
the resulting sample dried on a steel dryer, ground on an Engelhar
grinder, bucked to pass through a 100-mesh sieve, and divided into
packages, one going to the laboratory for analysis and one to the ow
ore, while the third is filed as a control, in case of dispute.

The power-house of the concentrator, 136x150′ in size, stands be
connects the two halves of the concentrator proper. The construc
steel, with brick walls, and there are three 15-ton traveling cranes, o
Equipment includes two 4-cylinder triple-expansion condensing engin
indicated h. p. at 200 lbs. steam pressure, but run at 150 lbs. pressur
ing 1,750 h. p. each, with a 4-cylinder triple-expansion 1,150-h. p. engi
reserve as an auxiliary. There also is a complete electric plant, tak

llation near Helena, and from Flint Creek Falls, 22 miles west of ctric power being used in preference to steam, but with the steam ng intact for emergencies. This plant operates the mill and fur- for lighting the works, lighting the city of Anaconda, operating t-car system, etc.

centrator boiler-house, of brick and steel, located behind the coal- 1 300-h. p. Stirling water-tube boilers, feed pumps, etc., with an steel stack, 160′ high, of 14′ diameter.

centrator plant proper consists of 2 steel and wood buildings, on ations, each 255x350′, each containing 4 complete sections, or 8 in ection contains a 12x24″ Blake crusher, two 7x10″ Blake crushers, for coarse concentrates, 1 set of 15x42″ coarse rolls, 1 set of 15x42″ Evans jigs for fines, 1 set of 15x42″ rolls for middlings, 18 Evans ddlings, 3 six-foot Huntington mills, 18 Evans finishing jigs and ables, with a large number of classifiers, settling tanks, dewatering tors and trommels. The first crusher reduces ore to 3″ size, which 2 sets of trommels for sizing, oversize material going thence to 2 shers, which reduce it to 1½″ size. Two belt-elevators take this a series of trommels for coarse sizing, oversize going to coarse produce coarse concentrates for the blast-furnaces. The waste from jigs goes to 2 sets of 15x42″ rolls for crushing, and is thence elevated d. In the jigging department all undersize material from crushers automatically. The jigging sections have Evans jigs in 3 double Evans hydraulic classifiers making 3 sizes of concentrates, which storage bins, while middlings go to the middling department, where 5x42″ rolls crush the material to about 1¼″ size, this going by belt- o 4 sets of trommels, from which the undersize goes automatically to e classifiers, which feed 18 double Evans jigs, set in a triple row. es from the middlings department are mixed with concentrates from g department, going thence to storage bins. Middlings are collected s, and taken by elevators to the regrinding department, where three ton mills are fed from V-shaped tanks, the ground material passing ¼″ screens to hydraulic classifiers, thence to the jigs, both concen- tailings being carried by water, in launders. The slimes depart- 33 Wilfley tables, fed from the bottoms of V-shaped tanks, concen- g washed in launders to the settling tanks, at the foot of the con- building.

ankhouse, of wood, is 70x670′, containing 9 settling tanks for each ch tank being 19x19x15′, with a capacity of 420 tons. Each section s is divided into 6 tanks for the first settlement of concentrates, settling the overflow of the first settlement tanks, the overflow from settling tanks going to 3 large tanks, common to all 4 sections of of the mill, the overflow from the final settlement tanks going to a , together with slum-water from all the settling tanks and Wilfley he product of the first settlement tanks is known as fine concen- t of the second tanks as second settlement concentrates, and that rd series of tanks as tank-slum. The fine and second settlement es are treated in the roaster building, and the tank-slum goes to the g plant.

lum-ponds, located in the valley below the works, are 6 in number, bout 300x630′ average size. As soon as one pond is filled the slum- m the works is diverted to an empty pond, and as much water as drained from the filled pond, slums being excavated by one of 2 l traveling cableways operating 5-ton buckets, the slums being piled n the edges of the pond, and allowed to drain. Dried slums are

removed by buckets, and loaded into hopper-cars, thence to railway cars c veying them to storage-bins feeding the briquetting plant. Slum-water c taining the least values is used for condensing purposes and for sluicing s at the reverberatory and blast-furnaces. Settling tanks containing fine s second settlement concentrates, after draining, are emptied from the bott into cars and material taken to the charging floors of the calcining buildi being weighed and sampled before dumping. Throughout the works mater is weighed and sampled on entering and leaving each building, thus giving accurate check on the work of each department.

The roaster building, 96x412′, of steel frame on stone foundations, contai 64 McDougal calcining furnaces of the Evans-Klepetko type. Each furnace 16′ in diameter and 18′ high, with 6 hearths having revolving water-cool shafts and arms driven by top-gearing, rabbling arms being so set as to mo material from circumference to center, and vice versa, on alternate heart until the material drops from the lower hearth into 2 calcine hoppers und each furnace, beneath which run the railroad tracks, hopper cars transporti calcines to the reverberatory building. No carbonaceous fuel is require except occasional fine coal for charging a cold calciner. Gases are draw through brick flues into 40x40x300′ brick and steel dust-chambers having co crete inner walls, where much of the flue-dust settles. The bottom of the dus chamber has a series of hoppers, underneath which are railroad tracks, flue-du going direct to the reverberatory furnaces for smelting. The barrings adhe ing to the rabbling arms and shafts are removed and sent to the blast-furnace In charging the roasters, finely crushed limestone and screenings from firs class ore are admixed, in the feed-hoppers, for the purpose of producing balanced charge for the reverberatories. The capacity of each calciner is tons per day.

The reverberatory department consists of two 183x225′ steel building each containing 4 coal-fired furnaces with hearths 19′ wide and from 102′ 116′ in length, with grate area of 8x16′, having a smelting capacity of tons daily, on natural draft. Fuel is Wyoming coal, dumped into hopp having 4 discharges directly above the fire-box. The flames, after leavi the furnaces, pass through two 375-h. p. Stirling boilers, in tandem, reduci the temperature of the gases to about 600° Fahrenheit when reaching the ma flue, and securing about 600 h. p. from the waste gases. Ashes and par burned coal drop from the fire-boxes into launders carrying them over grizzly, the larger pieces of ash going to the slag-sluice, while the smal pieces, containing unburned coke and coal, are sluiced to the coal-washe Slag is skimmed from the reverberatories, at 4-hour intervals, into a stre of slum-water, which granulates and sluices it, through a launder with ca iron lining, to the slag-dump. By allowing slag to accumulate until 3″ or above the skimming-plate, it is possible to skim the furnace very rapidly, tons of slag being skimmed in 20 minutes. Matte is kept some distance be the skimming-plate, rendering it impossible to pull out any of the matte, t obviating explosions. Matte is tapped from the side of the furnace thro copper tap-hole plates, and run through cast-iron launders, lined with silici material, to 10-ton hot-metal ladles that go by tram to the converters. Fi brick used in the reverberatories are made by the company's brick-pla bricks being 3x6x15″ in size. Bridge-walls and sides are luted with clay eve 30 days, when necessary. Bridge-wall plates are kept cool by the circulati of air through pipe connecting with the main flue. Fumes from the reverbe tories are taken through underground flues, 1 for each row of furnaces, to t main flue. Flue-dust is not briquetted, but is treated in reverberatories wi fines. The reverberatory department has given exceptionally satisfactory sults, effecting an increase of about one-third of the normal smelting capacit

reduction of about one-third in fuel charges, saving about 10% of unburned fuel in the coal washery, reducing labor costs and securing about 600 h. p. of energy from the waste gases.

The briquetting plant occupies a 55x192′ frame building containing 4 Chambers end-cut auger-type briquetting machines, each of about 700 tons daily capacity, 2 machines being sufficient, as a rule, to handle all material. Briquettes are made of fine concentrates, fine first-class ore and pond-slums, mixed with crushed coke and coal from the coal-washery. Materials are brought from storage-bins by belt conveyors to a pug-mill, whence they are discharged into the briquetting machines, where further mixed and forced through a former in a continuous bar, which is cut into 10-pound briquettes by a revolving cutter. Briquettes are taken by a series of belt-conveyors to storage hoppers, whence loaded into charging-cars for the blast-furnaces.

The blast-furnace building, of steel frame, 82x269′ in size, has 3 floors, the first carrying the railroad tracks, second being the main operating floor and third the charging floor. There formerly were numerous furnaces of 42x180″ section at the tuyeres, and 40′ high, of about 400 tons daily capacity each, but these have been made into 3 furnaces by building connections between, 2 of the 3 furnaces being 51′ in length, while the third is 87′ long, with a uniform width of 56″ at the tuyeres. The two 51′ furnaces have a maximum capacity of 1,800 tons each, and the 87′ furnace has smelted 3,100 tons in 24 hours. It is possible to repair one end of any of these furnaces while frozen, with full smelting in progress at the other end. The large blast-furnaces of the Anaconda mark perhaps the most important step taken in copper smelting since the invention of the bessemer process of copper conversion. The bottom of the centre of each furnace is of silica brick, laid on water-cooled cast-iron plates mounted on cast-iron columns, with a gradual slope to each discharge spout. The 87′ furnace has 3 discharge spouts and three 16′ settlers, with 150 four-inch tuyeres, the 51′ furnaces having 88 four-inch tuyeres and two 16′ settlers each. The credit for these gigantic furnaces is due to Mr. Mathewson. Among the advantages are increased hearth area, with but two ends to hold crusts, while crusts forming on the sides can be disposed of by permitting the furnace to run down, in which case the crust will drop, or, if necessary, can be barred. The large furnace has a smaller radiating surface for the same hearth area, requires less fuel, and may be repaired rapidly while in blast. Leaking water-jackets may be replaced in 4 to 8 hours. Each 51′ furnace has three 7′ 45° unlined steel flues, with 5 similar flues on the 87′ furnace. The charging floor has railroad tracks on either side of the furnaces, side-dumping hopper cars being handled by compressed-air locomotives. The charging-doors extend full length, and are opened and closed by compressed-air pistons, all charges being fed automatically. In front of each furnace is a 16′ settler, receiving a continuous flow of molten matte and slag, matte being drawn from the bottom into 10-ton hot-metal cars, going thence to the converters, while the slag skims into sluices and is granulated and washed to the slag-dumps by running water. Overhead cast-iron flues carry fumes and smoke into a dust-chamber exactly duplicating that in the calcining department, and which connects with the main flue. The product of the first fusion is a 44% matte, with slags averaging about 0.5% copper only. A charge-train consists of 18 cars, receiving material by weight from the storage bins adjacent to the blast-furnace building. These bins, of wood, are in 3 rows, each row being 28′ wide, 20′ deep and 786′ in length, divided into bins of various sizes, providing storage for first-class ore, matte concentrates, limestone, coal, limestone, silica, etc. All bin gates are operated by compressed air. Two charge-cars carry a charge, this ranging from 9,400 to 11,000 lbs., according to composition.

The converter building, 176x416′ in size, is of steel frame, exc crushing and mixing department of the lining plant, which is of wood. are two 60-ton 60′ span electric traveling cranes for handling convert ladles, with two 15-ton auxiliary electric traveling cranes in the department for general use, one of the larger cranes handling copper s from the converters, and one handling converters for relining. Matt both blast and reverberatory furnaces is brought to the charging-floor converter building, which is 23′ above the operating floor, and is poure ladles into a launder, the end section which is so pivoted that it can be out of the way when the converter shell is filled, the shell being fille in a nearly vertical position, with air on. Charge per shell is 7 tons of regardless of condition of lining, and charge is blown up to blister co the same converter. There are 11 stands, operated hydraulically, wit of the horizontal barrel type, 8′ in diameter and 12′ 6″ long. Converte off into hoods with flues leading to a dust-chamber similar to that calcining department. The matte is blown to low grade blister copp poured into a sheet-steel clay-lined ladle, which is taken by crane to a hy cradle, from which it is poured into the casting furnace. There are two and one 110-ton casting furnaces, 2 being in continuous use. Copper is in at the side, and when charged to 50 or 60 tons, oxidation is begu 90-lb. air pressure. When the furnace is full, slag is removed and ox is complete, the charge then being poled to the desired pitch, and ca machine with a platform conveyor having moulds attached, operated lically. Molten copper is run into a suspended ladle, from which it is by hydraulic power into moulds. When the mould is filled, the ladle is to a horizontal position, and the next mould is brought into position, process repeated. Capacity of the casting machine is 25 tons hourly cast copper is chilled by a spray, and dumped from the moulds upon a p conveyor running through a tank of water, then trucked to the scales, w marked and shipped. Anodes assay about 97% copper and 80 oz. per ton.

The lining department, in the converter building, includes also a building on the southwest corner of the converter building, where mat prepared. Lining material is highly silicious ore having gold and silver and slum is used for a binder. Material is reduced by a Blake crush fine rolls, and sized by trommels, which feed four 7′ Carlin grindi mixing pans, where it is ground and mixed with pond-slum to the prop sistency. Lining material is then transported to the converter sh tamped around a steel form by a special Ingersoll-Sergeant tamping m of 5″ diameter with a 20″ stroke, supported by a revolving jib-cran vertical motion controlled hydraulically. After lining, the shell is r by crane to a drying stand, where it is dried by a fire of coal and scra secured from the concentrator and sampling mill.

Coal ashes from the reverberatory department are sluiced to th washery, which has a complete jigging equipment that saves about daily of coal and coke, which is ground and sent to the briquetting ment, where it is mixed with other material and bricked.

The 85x526′ smelter power-house, of brick and steel, has a 15-ton traveling crane running the entire length of the building. There Connersville blowers, direct-connected to Corliss engines, each with a c of 300 cubic feet of free air per revolution, compressed to 40 oz.; s compressors with an aggregate capacity of about 2,500,000 cubic feet air per hour, compressed to 16 lbs. pressure; three 90-lb. air-compress general use, and four 900-lb. air-compressors furnishing air to the locor of the tram-line. Four hydraulic compressor pumps and accumulator

water to 360 lbs. pressure per square inch, for use in the hydraulic apparatus at the converter plant, and for various other purposes. Steam is supplied from the waste-heat boilers at the reverberatory building, and from twelve 300-h. p. Stirling water-tube boilers in a boiler room at one end of the power-house. The principal work is done, however, by electric energy, the steam plant being held merely as an auxiliary under normal circumstances.

The system of flues is most excellently planned and highly efficient. There are 3 principal flue-lines, from the roasting department, blast-furnaces and reverberatory furnaces, each being 20′ wide and 15′ high, built of brick and steel. The converter department has two 7′x7′ flues. The blast, roaster and converter flues connect with their respective dust chambers, while the reverberatory flue leads direct from the furnaces. Lengths of the flues are as follows: blast flue, 1,653′; reverberatory flue, 842′; converter flue, 703′; roaster flue, 488′. These flues converge into one main flue, which, for the first 1,200′ of length, is 60′ wide, with side walls 20′ in height, the bottom being excavated at an angle of 30° from horizontal. The roof is of "I" beam and brick arch construction. For the balance of distance to the stack, 1,122′, the main flue is 120′ wide, having a roof of No. 9 sheet steel. The main flue leads to a brick stack 300′ high, with inside diameter of 33′ 4″ at the bottom and 16′ at the top, with a thickness of 4′ 6″ at the bottom, requiring 3,000,000 brick in its construction, with the top of the stack 932′ above the valley. Underneath the main flue is a tunnel 7′ high and 55′ wide. Flue-dust is drawn off through hoppers, placed at intervals of 10′, into cars operated by gravity from a set of drums located at the stack. Loaded cars are taken from the end of the main flue and elevated to 2 sets of flue-dust bins adjacent, one set taking arsenical flue-dust while the other receives flue-dust that is to go direct to the reverberatories.

Much trouble was experienced in the past from damage suits arising from the fumes thrown off from the smelter, until the building of the new stack and the installation of an arsenic plant, which treats about 60 tons of dust daily. Arsenical flue-dust is taken from the bins by inclined revolving pipes, leading to the feed hoppers of 2 Brunton revolving-hearth roasting furnaces. Fumes from these are conducted through 240′ of zigzag flue having about 40 cells, the cooling of the fumes subliming the arsenic on the walls. At intervals roasting is suspended, and the sublimated arsenic is scraped from the walls of the cells and taken to a small reverberatory furnace, fired by coke, and resublimed in a similar zigzag flue. The first product is a 90% arsenic sesquioxide, and the final product a 99.8% arsenic sesquioxide, which is ground, barreled and shipped.

The local transportation system of the Washoe works includes 48 miles of standard-gauge railroad tracks, equipped with 17 Porter air-locomotives, of 12 to 22 tons weight each, and 240 cars. The air receivers of the locomotives are charged at 900 lbs. pressure, cut to 150 lbs. pressure at the cylinders by reducing valves. There are charging stations at frequent intervals, fed by an extensive system of high-pressure pipes. Locomotives are recharged about every 20 minutes, 2 minutes being required for the work. The tram system handles about 13,000 tons of material daily.

The electrolytic refinery of the Anaconda was closed August, 1903, blister copper being sent east for refining. The refinery is a portion of the old reduction plant, about 2 miles from the Washoe works and on the opposite side of the valley.

In addition to the various milling and smelting departments previously described, there are large and well equipped shops, including a smithy, boiler-shop, machine-shop, carpenter-shop and electric repair shop. There also is a large foundry and machine shop at Anaconda, about 2 miles from the smelter

doing new work and heavy repairing, in addition to a general custom b

The laboratory sampling mill, of brick, 29x63′ in size, cares for all lurgical samples taken throughout the works, there being about 9,000 of different kinds of material monthly.

The laboratory, of brick and stone, 2 stories high, is one of th thoroughly equipped at any metallurgical plant. All samples taken works and at the sampling mill are sent to this department, and there ar there being about 15,000 actual determinations monthly, for coppe silver, iron, zinc, sulphur, alumina, silica, etc. There are testing and graphic departments in the basement of this building.

The general office building, of brick, contains offices for the m assistant superintendents, accounting department, engineering depa etc., also a large telephone exchange, there being a private system con all departments of the works, with long distance connections for Butt ena, Great Falls and other Montana points. There also are private te wires connecting with the Western Union and Postal companies at An

The amount of water required by the Washoe works, when in full tion, is about 35,000 gallons per minute. Water is stored in Storm La Silver Lake, about 15 miles west of Anaconda, water from both cree lakes being gathered by a dam about 4 miles west of Anaconda, and d in a 5x7′ flume, 7 miles long, that brings the water to the works.

The Washoe works treat, in addition to Anaconda ores, the produc the Butte & Boston, Washoe, Trenton and Parrot companies of the A mated Copper Co., and the ores of the North Butte Mining Co. as well, a capacity of about 11,000 tons of raw ore daily, and of about 150, lbs. of fine copper yearly. The Anaconda concentrating ore carries a age of about 3 to 4% copper, 1 to 6 oz. silver, 0.01 to 0.02 oz. gold, 16 oxide, 17% sulphur and 55% silica. The tailings carry an average o 0.7% copper and 90% silica.

In concluding a description of this wonderful metallurgical plant, is the largest in the world, it is but simple justice to give credit Mathewson and his corps of able assistants for the great technical sk executive ability that are manifested in a remarkably high degree i department. An inspection of the plant is a genuine pleasure. The works employ about 2,000 men directly and 500 men indirectly.

Miscellaneous enterprises of the Anaconda Copper Mining Co. in brick plant at Anaconda, manufacturing mainly silica brick from loca rial, the refractory products of this plant ranking among the best. T pany has sawmills at Hamilton, Montana, which in 1907 cut 24,275, lumber, board measure, of which the company used 5,463,000′, the being sold. The company's coal mines at Belt, Montana, in 1907 p 233,298 tons of coal, of which 16,111 tons were used at the mines, 106,5 were shipped to other departments of the company, and the balance w

The Anaconda owns a controlling interest in the Butte, Anaconda cific Railway Co., which, in 1907, transported 4,258,370 tons of ore and and 205,862 passengers. Gross earnings were $1,434,767.32, with net e of $160,786.04, on which a 6% dividend of $60,000 was paid on the cap tion of $1,000,000.

Early in 1907 the Anaconda made a 5-year contract with its mine men, under which wages were reduced October, 1907, when the price of fell, the men submitting to the reduction, in accordance with their co without a murmur. The relations of the company with its employes ceptionally harmonious and satisfactory.

For 1907 the production of ore was 1,110,203 tons, yielding 63,055,6 fine copper, 2,001,351 oz. fine silver and 8,290 oz. fine gold, the average

tion being 2.85% copper, 1.73 oz. silver and 0.007 oz. gold per ton. For 1905 the copper production was 95,443,730 lbs., and for 1906 was 94,963,000 lbs., the falling off in 1907 being due to suspension of operations during the latter part of the year.

The Anaconda has immense ore reserves, and is capable of making considerably more copper than the average production of slightly under 100,000,000 lbs. yearly. The management throughout is of a high order of ability, and the property, which seemed, only a few years ago, to be on a downward grade, again ranks among the most vigorous, profitable and promising mines of the globe.

ANACONDA MINE. **NEW MEXICO.**

Mine office: San Pedro, Santa Fé Co., N. M. Carruthers & Field, owners and managers. Ores carry gold, silver, lead, copper and zinc. Has steam power and is said to have a small smelter. Idle.

ANACONDA MINE. **WESTERN AUSTRALIA.**

Mine office: Mount Morgans, Margaret Goldfield, Western Australia. Was a considerable producer of copper ore in 1906, the district shipping 4,316 long tons of copper ore, mainly from this property.

ANACONDA MINING CO. **MONTANA.**

Office: 42 Broadway, New York, N. Y. Mine office: Butte, Silver Bow Co., Mont. Was the parent of the Anaconda Copper Mining Co., and still in existence at last accounts.

ANACONDA MIZPAH COPPER CO. **NEVADA.**

Dead. Was merged, circa June, 1907, in the Ely-National Copper Co. Formerly at Ely, White Pine Co., Nev.

ANACONDA PROPRIETARY COPPER, GOLD & SILVER MINE. **AUSTRALIA.**

Dead. Was liquidated and succeeded by Melrose Copper Mines.

ANACONDA-SONORA COPPER CO. **MEXICO.**

Office: 95 East Fifth St., St. Paul, Minn. Letter returned unclaimed from former mine office, Sahuaripa, Sonora, Mex. J. W. Shepard, president and treasurer; Herbert W. Merrill, vice-president; J. F. Hibscher, secretary. Organized March 17, 1906, under laws of South Dakota, with capitalization $5,000,000, shares $10 par. Annual meeting, first Tuesday in June. Is said to be free of debt. Lands, 400 hectares and a 40 hectare millsite, with 23,000 acres miscellaneous lands, fairly timbered, with water rights. Property carries about 3½ miles of the strike of a porphyry and limestone contact deposit of 20' to 100' width, showing oxidized and sulphide ores. Old management claimed ore averaged 17.5% copper, 19 oz. silver and $3.20 gold per ton, which was entirely too high, and apparently a deliberate misstatement. Mine has several tunnels, with about a quarter-mile of workings. The 120-ton smelter that the old management claimed to be building, 1906, seems to have become merely a smelter-site, on the Yaqui river, 9 miles west of the mine. Apparently present management is not responsible for the lies and stock-jobbery of the original directorate. Idle.

ANCHORIA COPPER MINING CO. **WYOMING.**

Office: 365 Tenth St., Oshkosh, Wis. Mine office: Copperton, Carbon Co., Wyo. D. H. Craig, president; H. O. Granberg, secretary-treasurer; E. M. Sanborn, superintendent; Frank Earle, consulting engineer. Organized April, 1901, under laws of Wyoming, with capitalization $1,000,000, shares $1 par. Lands, 4 claims, area 82 acres, patented, in the Battle Lake district, developed by a 200' shaft and tunnels of 45' and 60', showing an ore body estimated at 45' width, giving average assays of 17% copper and from a trace to $5 gold per ton. Has a 40-h. p. steam plant, with hoist good for 500', 3 power drills and 5 substantial mine buildings, of logs.

ANCHOR MINING CO. UT

Office: Hancock, Mich. Operating office: Salt Lake City, Utah. C
A. Wright, Henry L. Baer and John D. Cuddihy, directors. Organized Ju
1908, with capitalization $150,000, shares $25 par. Lands are in Wasa
county, Utah.

COMPAÑIA MINERA DE ANDACOLLO. CHI

Office: Santiago de Chile. Mine office: Andacollo, Coquimbo, Chile.
ganized July 4, 1906, under the laws of Chile, with capitalization 1,125,
pesos, shares 15 pesos par.

ANDERSON-APACHE COPPER CO. NEW MEXI

Office: Douglas, Ariz. Mine office: Hachita, Grant Co., N. M. E
ploys circa 35 men. Geo. H. Neil, president; Harry Duey, vice-preside
Chas. H. Howe, secretary & treasurer; Arthur Houle, general manager; L.
Houlton, mine superintendent. Organized June 1, 1907, under laws of A
zona, with capitalization $500,000, shares $1 par; issued, $160,925. Lands
claims, area 100 acres, circa 6 miles from Hachita, known as the Apache mi
held under a $100,000 bond and lease. Property, opened 1883, was work
continuously, until 1907, by chloriders, producing approximately $200,0
Lands show contact deposits between porphyry and Carboniferous limesto
carrying cuprite, malachite, chalcocite, chalcopyrite and chrysocolla, ores be
mainly oxidized to present depth, and estimated by company to average ab
10% copper and 20 oz. silver per ton. Mine has a 2-compartment 300' sh
with about 3,500' of workings, estimated to show about 250,000 tons of
with about 40,000 tons blocked out for stoping, which estimates seem h
Equipment includes a 25-h. p. Fairbanks & Morse gasoline hoist. Prope
is shipping about 120 tons of ore weekly, averaging about $17 in value
the Copper Queen smelter, and is considered promising.

ANDERSON MINING CO. BRITISH COLUM

Dead. Formerly at Alberni, Vancouver Island, B. C.

ANDES COPPER MINING & EXPLORATION CO., LTD. CH

Office: 18 Bishopsgate St., London, E. C., Eng. Wm. B. Broderick, ch
man; A. M. Harris, secretary. Organized July 29, 1897, under laws of G
Britain, with capitalization £100,000, shares, £1 par; issued, £6,707, one
paid. Lands are in the province of Tarapacá, Chile. Idle some years
apparently moribund.

SOCIEDAD BENEFICIADORA DE MINERALES ANDINA. P

Mine office: Chico, Yauli, Junín, Perú. Has argentiferous copper
Idle.

SOCIÉTÉ DES MINES DE CUIVRE ANDREA. SP

Office: Brussels, Belgium. Mine office: Andrea, Badajoz, Spain. O
ized Sept. 27, 1907, under laws of Belgium, with capitalization f1,000,0
10,000 shares of f100 par, with 10,000 shares without assigned value.
include the Andrea, Esperanza and Neustra Señora del Carmen mines, i
district of Lloreña.

ANGANG COPPER CO. ME

Office: Coliseo Nuevo, 4, Mexico, D. F. Mine office: Chirangan
Zitácuaro, Michoacán, Mexico. Arthur Chippendale, superintendent.
issue supposedly owned by Arimex Copper Co., a short-winded promotio
Thomas W. Lawson. Has a considerable body of low to medium-grade ch
pyrite, with a limited amount of development. Idle practically since bi

COMPAÑIA METALURGICA DE ANGANGUEO. ME

Mine office: Anganguco, Zitácuaro, Michoacán, Mex. Property
leased from the Michoacán Railway & Mining Co., Ltd., and the smelter

...tically rebuilt. Owing to excessive royalties, high cost of coke and in...ficient development of mines, property was closed down, and company ap...rently is a failure.

ANGEL MINING CO. **ARIZONA.**

Dead. Property passed to Arizona Gold & Copper Mines Co. Formerly ...t Wickenburg, Maricopa Co., Ariz.

ANGLO-AMERICAN COPPER CO., LTD. **ARIZONA.**

Office: 21 Ironmonger Lane, London, E. C., Eng. Mine office: Kelvin, ...al Co., Ariz. Jos. H. Gordan, J. P., managing director; C. M. Gordan, gen...al manager; W. R. Feldtman, consulting engineer; C. E. L. Norris, secretary. ...ganized Jan. 21, 1905, under laws of Great Britain, with capitalization £100, ...shares £1 par. Debentures, £12,000 authorized; £2,000 issued. Lands include ...the old Ray mine, which has a concentrator that was overhauled 1906, and ...some diamond drill boring done. Property presumably sold.

ANGLO-AMERICAN COPPER MINING COMPANY OF PARRY SOUND, LTD. **ONTARIO.**

Letter returned unclaimed from former office, 211 State St., Chicago, Ills. ...Mine office: Parry Sound, Parry Sound district, Ont. Isaac Block, president; ...Jacob Newman, Jr., secretary and treasurer. Organized 1900, under laws of ...Ontario, with capitalization $3,000,000, shares $1 par. Lands are on Wilcox ...Island, near Parry Sound, showing veins carrying copper, silver, gold, cobalt ...and zinc, rendering the ore exceedingly refractory. Company estimates av...erage ore values at 20% copper and 10 oz. gold per ton, which, of course, is ...untrue. Has one shaft, 125' deep. Mine could be operated opencast. Idle for ...some years and company apparently moribund.

ANGLO-AMERICAN DEVELOPMENT CO. **MEXICO.**

Office: El Paso, Texas. Mine office: Barranca de Cobre, San Andres del ...Rio, Chihuahua, Mex. H. T. R. Cowell, president. Was said, 1908, to plan ...taking over property of the Barranca Copper Co.

ANGLO-AMERICAN GOLD & COPPER CO. **MEXICO.**

Dead. Lost its lands. Formerly at La Cananea, Arizpe, Sonora, Mex. Fully ...described Vol. IV.

ANGLO-BUTTE COPPER, LTD. **MONTANA.**

Office: 564 Salisbury House, London, E. C., Eng. Mine office: Butte, ...Silver Bow Co., Mont. Organized Apr. 11, 1907, under laws of Great Britain, ...with capitalization £6,030, in 6,000 ordinary shares of £1 par and 600 deferred ...shares of 1s. par, to carry on the business of copper mining.

COMPAÑIA ANGLO-CHILENA DE COLLAHUASI. **CHILE.**

Office: Valparaiso, Chile. Mine office: Collahuasi, Tarapacá, Chile. Or...ganized May 17, 1906, under laws of Chile, with capitalization £200,000, shares ...£1 par.

ANGLO-CHILIAN EXPLORATION CO., LTD. **CHILE.**

Dead. Was liquidated 1905. Formerly at Canutillo, Huasco, Chile.

ANGLO-CHILIAN NITRATE & RAILWAY CO., LTD. **CHILE.**

Mine office: Tocopilla, Antofagasta, Chile. Property includes the San Juan, ...Mamina, San Carlos, Feliciana, Colorada and Bella Vista mines. Production, ...1904, was 3,150 metric tons of ore ranging 14 to 19% in average copper tenor, ...the largest production being 2,400 tons or ore from the Mina Feliciana, averag...ing 15%.

ANGLO-CHILI CONCESSIONS, LTD. **CHILE.**

Office: Broad Street House, London, E. C., Eng. W. S. Miln, managing ...director; C. B. Parry, secretary. Organized Apr. 12, 1907, with capitalization ...£6,000, shares £1 par; issued, £5,250, fully paid. No trace of operations ...noted in Chile.

ANGLO-MEXICAN MINING & EXPLORATION CO. ME

Office: St. Louis, Mo. Mine office: Guachinango, Mascota, Jalisco, Geo. B. Clark, president; Thos. B. Rowe, general manager; John Bro vice-president; Chas. L. Rucker, secretary; E. W. Farnham, treasurer. organized with capitalization $650,000, as a holding company. Lands, 9 including the Santa Laura group, area 67 hectares, south of Ajuchitlán Cañas, Tepic; mineral lands in Durango and the Jalisco group of 42 he circa 42 miles from Guachinango, latter carrying several small veins of erous and argentiferous copper sulphides, and one gold vein, apparen antigua, said to be 15′ in width and to carry 20 grams gold per metri Company plans a 50-ton mill and plant to treat gold ores by direct cyani

ANGLO-ROUMANIAN FINANCE & TRADING CO., LTD. ROUM

Dead. Dissolved, August, 1904. Formerly at Baia Arama, Mehe district, Roumania. Described Vol. V.

ANGLO-SPANISH COPPER CO., LTD. S

Office: 4 Broad Street Place, London, E. C., Eng. Mine office: A Huelva, Spain. C. F. Lupson, secretary. Organized Jan. 9, 1907, unde of Great Britain, with capitalization £300,000, shares £1 par. Lands perpetual leases of the San Vicente, Fronteriza, Valrubio, Carolina and I groups of copper mines, area 180 hectares, between the Rio Tinto and T mines, said to carry upwards of 3 miles of the strike of the San Vicent giving average assays of 2.71% copper, 28.1% sulphur, 1 dwt. 6 grain and 2 oz. 13 dwts. silver per long ton. La Carolina and La Infanta min undeveloped, but have good ores, La Carolina giving assays up to 30% and La Infanta giving average assays of 4% copper and 12 oz. silv metric ton. The Valrubio group carries the extension of the San V vein, and the Fronteriza is considered a promising property. Principal de ment is on the San Vicente, which has an 1,800′ tunnel with about 1 m workings. Company planned, for 1909, an ore production of about 75,00 but at last accounts vendors, who control company, were in litigation wit purchasers of shares over value of company's lands.

ANGLO-WESTPHALIAN COPPER CO., LTD. GERM

Office: 9 St. Mildred's Ct., London, E. C., Eng. A. W. Johanning, tary. Organized Aug. 29, 1904, under laws of Great Britain, with capi tion £1,000,000, shares £1 par. Property includes the Kampf mine, are hectares, also the Gottessegen and Gottesgabe concessions, area 874 he in Rhenish Prussia.

ANGUS COPPER MINING & MILLING CO.

Office: 10 North Eighth St., St. Louis, Mo. Location of prope any, unknown.

ANIMAS MINING & SMELTING CO. ME

Office: care of P. Sandoval y Ca., Nogales, Mex. Letter return claimed from former mine office, Llano, Magdalena, Sonora, Mex. Ores gold, silver, copper and lead. Main shaft, 400′. Has steam power and a smelter, employing about 30 men, at last accounts.

ANI MINE. JA

Owned by Furukawa Mining Co

ANITA CONSOLIDATED COPPER CO. ARI

Dead. Reorganized, 1903, as Anita Copper Co. Formerly at Wi Coconino Co., Ariz.

ANITA COPPER CO. ARI

Dead. Property sold, under foreclosure, and company practically suc by Titanic Copper Co. Formerly at Williams, Coconino Co., Ariz. Ful scribed Vol. VI.

ANITA COPPER MINES CO., S. A. **MEXICO.**

Is the Mexican incorporation of the Douglas Copper Co.

ANITA MINING CO. **MEXICO.**

Dead. Formerly at Colotlán, Jalisco, Mex. Described Vol. VI.

SOCIEDAD ESPAÑOLA DE FUNDICION DE LOS ANJELES. **CHILE.**

Office: Valpariso, Chile. Mine office: La Ligua, Aconcagua, Chile. Organized March 21, 1900, under laws of Chile, with capitalization 60,000 pesos, shares 100 pesos par. Property is Los Anjeles mine and San José smelter, latter having a matting furnace, property formerly making circa 650,000 lbs. fine copper yearly. Idle at last accounts.

ANNA MINE. **ARIZONA.**

Office: care of Fairbanks, Morse & Co., owners, Chicago, Ills. Letter returned unclaimed from former mine office, Providence, Yavapai Co., Ariz. Has copper-gold ores, opened by shaft, with a 15-stamp mill. Idle for some years.

ANNANDALE COPPER MINES & SMELTERS, LTD. **AUSTRALIA.**

Office: 4 Broad Street Place, London, E. C., Eng. Mine office: Blayney, N. S. W., Australia. C. H. Pinkey, chairman. Organized July 2, 1905, under laws of Great Britain, with capitalization £200,000, shares £1 par.

ANNANDALE MINE. **AUSTRALIA.**

Owned by New South Wales Mines & Smelters, Ltd.

ANNIE MINING CO. **WYOMING.**

Office: Laramie, Wyo. Mine office: Jelm, Albany Co., Wyo. J. F. Johnson, treasurer; Louis Miller, president and general manager; L. A. Hancock, secretary. Organized 1903, under laws of Wyoming, with capitalization $250,000, shares $1 par. Lands, 100 acres, 32 miles southwest of Jelm, said to show two 8' contact veins between granite and schist, opened by a 140' shaft and a 138' tunnel, showing azurite and bornite, assaying up to 20% copper and $10 gold per ton. Idle since 1904.

ANTELOPE GOLD & COPPER CO. **CALIFORNIA.**

Mine office: Loyalton, Sierra Co., Cal. In 1907 was sinking on a quartz vein of fair size.

ANTELOPE MINING & MILLING CO. **CALIFORNIA.**

Office: 704 Columbia Bank Bldg., Pittsburg, Pa. Mine office: Clio, Plumas Co., Cal. C. E. Christman, president; Henry Rosser, treasurer; Robt. Dilworth, secretary. Organized under laws of Arizona, with capitalization $1,000,000, shares $1 par. Lands, 6 claims, in 2 groups, carrying considerable timber and having a vein of 2' to 4' width giving assay values of $15 to $22 per ton, mainly in gold and silver.

ANTIGUA COPPER CO. **MEXICO.**

Office: 201 Ward Bldg., Battle Creek, Mich. Mine office: Alamos, Sonora, Mex. H. A. Clapp, general manager; D. H. Livingston, superintendent; A. W. Davis, treasurer. Organized 1906, as successor of Sonora Mining Co. Lands, 361 acres, showing contact fissures between granite-porphyry and limestone, carrying copper, lead, silver and gold values, mainly in sulphide ores. Has 5 shafts, deepest 105', and about 700' of tunnels, longest being the Margarita, 340', showing 4 veins, having claimed average widths of 3', 10', 12' and 15', and to give average assays of 6.8% lead, 17 to 30 oz. silver and $1 to $2 gold per ton from oxidized ore. Company claims that its gold, silver and lead will leave the copper without cost, as a by-product, which claim is not warranted.

ANTIGUA GOLD-COPPER CO. **HONDURAS.**

Office: 224 St. Charles St., New Orleans, La. Mine office: Minas de Oro, Honduras. W. W. Duson, president; Jas. L. Wright, vice-president; L. S. Scott, secretary and treasurer; preceding officers, Sylvan Levy, Lionel L. Lyons and E. L. Chappuis, directors; A. Neustadter, superintendent; E. B. Thompson,

mine superintendent. Organized March 26, 1907, under laws of Ariz capitalization $2,000,000, shares $5 par. Annual meeting, first Tu September. Lands, 531 acres, near the Honduras Rosario, circa southeast of Puerto Cortez, carrying considerable timber, in both hard woods. Property shows antigua workings, with about 1,500' of new developing argentiferous and auriferous copper ores in limestone. ments include 4 buildings and a 48x80' frame stamp-mill, of 30 tons daily capacity, having 5 Allis-Chalmers stamps and 3 Huntington m has given assays of 2 to 3% copper, 2 to 4 oz. silver and $2 to $4 gold

MINA ANTIGUA PILAR.

Mine office: Colmenarejo, Madrid, Spain. Property is an old opened 1906, which was producing small quantities of cupriferous last accounts.

COMPAÑIA DE COBRES DE ANTOFAGASTA.

Office: Blanco No. 144, Valparaiso, Chile. Mine office: Chuqu Antofagasta, Chile. Federico Lesser, chairman; Edourado I. I. Sandif chairman; Carlos R. Harrison, secretary; Alejandro Muirhead, general Organized Oct. 5, 1900, under laws of Chile, with capitalization £65,00 £10 par. Lands, 30 claims, area 100 hectares, also 2 kilometers frontage for water power. Property is served by a branch of the Railway. Property considered well located.

COMPAÑIA INDUSTRIAL DE COBRE DE ANTOFAGASTA.

Office: Santiago de Chile. Mine office: Antofagasta, Antofagast Organized Nov. 23, 1905, under laws of Chile, with capitalization 500,0 shares 10 pesos par.

APACHE CHIEF MINING CO. A

Dead. Lands sold, circa 1907, to Arizona Success Mining Co. at Salome, Yuma Co., Ariz.

APACHE CONSOLIDATED COPPER CO. A

Office: P. O. Box 101, Denver, Colo. Mine office: Globe, Gila Employs 10 men. Hon. John I. Mullins, president; F. S. Pfister, vice- and general manager; Chas. T. Martin, secretary; E. M. Hurd, treasu ceding officers and Joseph Pfister, directors; Frank Pfister, mine superi Organized May, 1906, under laws of Arizona, with capitalization $ shares $1 par; issued, $1,200,000. Lands, 15 claims, unpatented, area 3 in the Richmond district, showing fissure veins and contact deposits limestone and quartzite, of which 1 vein, of about 5' width, is traceal 1,200'. Mine has shafts of 65', 45' and 20', with 6 tunnels, longest 33 719' of workings, showing about 400 tons of ore averaging about 3.5% up to 15 oz. silver, and from a trace to $2.50 gold per ton. In 1907 148 tons of ore returning 3.84% copper. Company plans continuin deepening shaft and installing a hoist.

APACHE COPPER CO. A

Office: 72 Trinity Place, New York, N. Y. Meyer Zulick, president. ization $2,500,000. Lands are in Yuma county, circa 25 miles eas Colorado river and 100 miles west of Congress Junction, Ariz. Mi veloped by shafts and tunnels, showing ore with good gold and silve Considerable ore has been mined and is on the dumps. Property is c valuable, if given adequate transportation facilities, or a near-by Idle.

APACHE DEVELOPMENT CO NEW M

Dead. Lands sold, 1907, to Anderson-Apache Copper Co. For Hachita, Grant Co., N. M. Described Vol. VI.

APEX COPPER CO. **COLORADO.**

Office: 304 Colorado Bldg., Colorado Springs, Colo. Mine office: Hayman, Park Co., Colo. Officers: John K. Vanatta, president; J. J. O'Driscoll, vice-president and general manager; C. W. Dolf, secretary. Organized March, 1903, under laws of Arizona, with capitalization $2,000,000, shares $1 par. Lands, 9 claims, area circa 90 acres, on Apex Hill, in the Lower Tarryall district, showing 2 nearly vertical contact veins, of 3' average width, between spar and limestone, carrying chalcopyrite and bornite assaying 2 to 30% copper, 7 oz. silver and $1.20 gold per ton, opened by shafts of 50', 120' and 250', and by 4 tunnels of 250' aggregate length. Has a 10-h. p. steam plant, with hoists, and a 7-drill Leyner air-compressor. Management is regarded favorably.

APOLLO COPPER MINING & MILLING CO. **UTAH.**

Dead. Formerly at Frisco, Beaver Co., Utah.

APOLLO GOLD MINING CO. **WASHINGTON.**

Office: New Haven, Conn. Mine office: Republic, Ferry Co., Wash. W. A. Case, superintendent. Property is the California mine, carrying auriferous and argentiferous copper and lead ores. Has steam power.

APPLE TREE COPPER CO., N. L. **AUSTRALIA.**

Office: 371 Queen St., Brisbane, Queensland, Australia. Mine office: Mount Cannindah, Queensland, Australia. Wm. Hasley, secretary; T. J. B. Howard, mine manager. Organized 1906, under laws of Queensland, with capitalization £1,200, shares £6 par. Lands, 4 leases, area 45 acres, 1½ miles from Mount Cannindah, having old workings consisting mainly of a 20' trench 500' long, showing a 6' vein with paystreaks of 2' to 4' width carrying 10 to 47% copper and up to 5 oz. silver and 3½ dwts. gold per long ton. Mine is said to show about 2,000 tons of ore.

ARAGON COPPER MINES, LTD. **SPAIN.**

Office: 12 Lime St., London, E. C., Eng. Mine office: Tobed, Zaragoza, Spain. Employs 10 men. Gaston de Fontenilliat, chairman; Aimé Bonna, vice chairman; preceding officers and J. D. O'Brien, directors; A. L. Lanseigne, secretary and treasurer. Organized Oct. 29, 1903, under laws of Great Britain, with capitalization £100,000, shares £5 par; issued, £5,000. Title changed January, 1907, from Rio Grio District Copper Co. (Tobed & Codos Exploration), Ltd. Lands, 14 claims, area reported by company as 1,100 acres. Ore is reported to average about 7% copper. Company has been handicapped by lack of capital, but hopes to secure additional funds shortly.

ARAKAWA MINE. **JAPAN.**

Owned by Mitsu Bishi Goshi-Kwaisha.

ARAMO COPPER MINES, LTD. **SPAIN.**

Office: 2 Metal Exchange Bldgs., London, E. C., Eng. Mine office: Pola de Lena, Asturias, Spain. C. W. Aston Key, secretary. Organized, July 1, 1897, under laws of Great Britain, with capitalization £40,000, shares £1 par. Property is the Aramo copper and cobalt mines. Idle for some years; no accounts made public, and apparently moribund.

ARAPAHOE GOLD & COPPER MINING CO. **COLORADO.**

Mine office: Sunset, Boulder Co., Colo. Organized, circa 1899, under laws of Colorado. L. D. Longhi, president and treasurer; J. S. Riggs, secretary. Lands, 4 claims and a tunnel-site, in the Sugar Loaf district of Boulder county, Colorado. Idle since 1902 except for annual assessment work, done at the personal expense of the president.

ARCADIAN COPPER CO. **MICHIGAN.**

Office and mine: 205 Montezuma St., Houghton, Houghton Co., Mich. Robert H. Shields, president and general manager; Sylvester T. Everett, vice president; William F. Miller, secretary and treasurer; preceding officers, John

C. Shields, James W. Shields, Wm. B. Anderson, Lucius J. Kilmer and S J. Beahan, directors. Organized Mar. 31, 1899, under laws of New Jersey, capitalization $3,500,000, shares $5 par.

Lands, circa 3,200 acres, including 5 old mines, worked in a small wa various periods in the past. Present company operated vigorously, 1898- and equipped the property with magnificent buildings and machinery, in ing a 3-stamp mill at Grosse Pointe. Operations proving unsatisfactory work was suspended June 15, 1903, hoists, machinery and shafthouses sold to the Trimountain Mining Co., stampmill was sold to the Cente Copper Co., and mine buildings disposed of, property being almost compl dismantled. Exploratory work was resumed October, 1905, on an amygdal bed about one-fourth mile east of the Isle Royale lode, previously worked, crosscutting from the 200′ level of the new shaft disclosed 5 copper bea beds in a distance of about 110′. Work was suspended March, 1908, but company plans diamond drilling from the bottom of the exploratory sh as there remains about a quarter mile of undrilled territory on the eas boundary, which may carry the southern extension of the Kearsarge lode the northern extension of the Baltic bed. Equipment includes a new air-c pressor. The old workings and equipment are fully described in Volume and II.

The floating debt, Oct. 11, 1906, was upwards of $714,000, but the c pany sold 800 acres of land to the Quincy Mining Co. for $750,000, liquidat the large floating indebtedness. At the annual meeting in January, 1908, c supplies and bills receivable aggregated $42,449. The property is large should contain workable copper deposits at some point. The quarter mil undrilled territory is, without question, the most promising part of the pany's lands, especially in view of recent important developments on Kearsarge lode to the north and the Baltic lode to the south.

ARC GROUP MINING CO. **WASHINGT**

Mine office: Kettle Falls, Stevens Co., Wash. Mine has a 70′ shaft the Queen claim, showing an 8′ vein carrying gray copper ore. Planned s ter shipments, 1908.

ARCTIC CHIEF COPPER MINES CO. **YUK**

Office: Spokane, Wash. Mine office: White Horse, Yukon. T. B. rison, president; W. J. C. Wakefield, secretary; W. J. Elmendorf, consu engineer. Lands, 6 miles west of White Horse, with good wagon road necting, include the Arctic Chief and White Horse mines, with sundry claims. Principal development is on the Arctic Chief, developed mainly cast, with tunnels and 820′ of underground workings, showing argentif bornite and chalcopyrite, disseminated in massive magnetite, in a vein o estimated average width, also a west ore body, discovered 1907, showing said to average 8% copper and $5 per ton in combined gold and silver va The Best Chance mine, held under bond, shows an outcrop of cupriferous netite, 25′ to 60′ high, 60′ wide and 400′ in length, carrying bornite and ch pyrite, with some oxidized ores, and several seams of chalcocite, opene sundry cuts, two 15′ pits and a 35′ shaft, showing ore assaying about copper and 3 oz. silver per ton. Production, to end of 1907, was 707 shipped to coast smelters, returning an average of 4.45% copper, 1.49 oz. s and 0.194 oz. gold per ton, equivalent to circa 63,000 lbs. fine copper.

ARDILLA COPPER MINES, LTD. **PORTUG**

Dead. Property seized, 1905, by debenture-holders. Formerly at rancos, Alemtejo, Portugal.

AREACHAP COPPER MINES, LTD. **CAPE COLO**

Office: P. O. Box 5754, Johannesburg, Transvaal. Mine office: Up ton, Gordonia, Cape Colony. Francis Oats, chairman; Jas. M. Calderw

M. I. M. M., consulting engineer. Organized under laws of Cape Colony, with capitalization £20,000, shares £1 par; working capital, £4,000. Lands, circa 44,000 acres, 16 miles from Upington, held under 2-year lease, at royalty of 3d. per long ton on ore shipped, with right to purchase base minerals only for £5,000 cash and £23,000 in shares. Mine has several shallow shafts and an opencut known as Bezuidenhout's quarry. Surface trenching at intervals, for 750', shows a cupriferous zone about 200' wide, with strike NNW., between granite and schist, with a gossan capping carrying considerable ore assaying 25 to 60% copper. Company plans smelting with a 20-ton reverberatory furnace, and made several small shipments, 1908, of ore returning 30 to 60% copper. Property considered promising.

ARENILLAS COPPER MINES, LTD. **SPAIN.**

Dead. Voluntarily wound up, May, 1904.

ARGENTA COPPER CO. **UTAH.**

Letter returned unclaimed from former mine office, Robinson, Juab Co., Utah. Idle for several years.

ARGENTA MINES CO. **BRITISH COLUMBIA.**

Office: 622-50 Congress St., Boston, Mass. Mine office: Ainsworth, Kootenay, B. C. Wm. F. Almy, president and general manager; Geo. R. Angus, secretary and treasurer; L. Hanna, superintendent; Alfred C. Gardé, engineer. Organized April, 1902, under laws of Maine, with capitalization $2,000,000, shares $1 par. Lands, 17 claims, are 550 acres, showing limestone, schist, and black slate, traversed by porphyry and trap dykes, a fissure in the schist, ranging 7' to 30' in width, showing chalcocite and chalcopyrite assaying 3 to 20% copper, up to 10% lead and 7 to 46 oz. silver per ton, with a trace of gold. Has tunnels of 93', 572', 644' and 1,288', with a total of 3,051' of openings, estimated to show 150,000 tons of ore. Company has developed 300 h. p. from a waterfall of several thousand horse power available. Has a 10-drill air-compressor and 5 power drills, with necessary mine buildings; is served by the Canadian Pacific Railway, and is 5 miles from Ainsworth, connected therewith by wagon road, built by the government. Officials and promoters fled January, 1908, for an accounting.

ARGENTINA-TIERRA DEL FUEGO EXPLORATION CO. **ARGENTINA.**

Office: care of Banco de Italia, Buenos Ayres, Argentina. Organized 1905, with capitalization £1,000,000.

ARGENTINE COPPER MINING CO. **UTAH.**

Mine office: Bingham Canyon, Salt Lake Co., Utah. Lands, sundry claims adjoining holdings of the Utah Consolidated. Idle.

ARGENTINE & GENERAL EXPLORATION CO., LTD. **ARGENTINA.**

Office: 35 Queen Victoria St., London, E. C., Eng. Organized March 23, 1908, under laws of Great Britain, with capitalization £50,000, shares £1 par, to buy, of Señor Don Justo Pastor Fonseca, mines known as Las Animas, Desagnadero and Restauradora, in Argentina.

ARGENTINE MINERALS, LTD. **ARGENTINA.**

Office: 62 London Wall, London, E. C., Eng. Seymour Caldwell, chairman; Henry Bacon, secretary. Organized January 4, 1904, under laws of Great Britain with capitalization £11,000, in 10,000 shares of £1 par and 20,000 deferred shares of 1s. par. Property is a mine known as San Antonio de los Cobres, in the province of Los Andes, Argentina. Company also has a smelting concession for the province of Salta, Argentina. Presumably idle.

ARGHANA MAADEN MINES. **TURKEY.**

Office: care of Imperial Minister of Forests & Mines, Constantinople, Turkey. Mine office: Arghana Maaden, Turkey. Is owned and operated by the Turkish crown. Mine was opened circa A. D. 1600, and has been operated vigorously for about 3 centuries. Development is mainly by adits. The ore,

averaging about 12% copper, is smelted with charcoal to a matte of 50 to copper tenor, which is shipped by camel to Tokat, for export. The wor are paid in food, clothing and tobacco, and mining processes are archaic respects. Production, which is hampered by lack of adequate transport facilities and by scarcity of fuel, is about 5,000,000 lbs. fine copper yea

ARGO COPPER MINING CO. MONT.

Dead. Merged, March 7, 1904, in Eclipse-Argo Mining Co. Forme Canyon Ferry, Broadwater Co., Mont.

ARGOLIS COPPER MINING SYNDICATE, LTD. GR

Office: 19 Eastcheap, London, E. C., Eng. Mine office: Nauplia daurus, Greece. H. H. Waller, secretary. Organized March 1, 1904, wit italization £5,000, shares £1 par; issued, £2,025. Property is a 25-year expiring December, 1929, of 854.4 hectares, at a rental royalty of 4s. p on ore produced. Idle.

ARGO MINING, DRAINAGE, TRANSPORTATION & TUNNEL CO. COLO

Mine office: Idaho Springs, Clear Creek Co., Colo. Chas. C. Parsons, dent; H. W. Robinson, secretary; Samuel Newhouse, managing director. italization, $100,000. Entire stock issue is owned by Argo Transporta Tunnel Co., Ltd., property being the Newhouse tunnel.

ARGO TRANSPORTATION & TUNNEL CO., LTD. COLO

Office: 3 Great Winchester St., London, E. C., Eng. Mine office: Springs, Clear Creek Co., Colo. F. Hargreaves, chairman; Jos. C. E. G secretary. Organized Nov. 29, 1905, under laws of Great Britain, wit talization £150,000, shares 10s. par; issued, 269,883 shares, fully paid. reconstruction of the Argo Tunnel & Mining Co., which, in turn, wa construction of the Newhouse Tunnel Co., and property is the stock Argo Mining, Drainage & Tunnel Co. Property, better known as the house tunnel, 17,740′ in length, and of 21,300′ projected length, probab longest mining tunnel in existence, has double tracks laid with 30-poun of 18″ gauge. For the first 12,000′ the tunnel is 9′ high and 10′ wide, mainder being 8′ high and 6′ wide. The tunnel was begun January, 18 has a grade of 5″ per 100′.

The mines under which this tunnel passes have produced about $70,0 in metallic values, and the tunnel has cut sundry veins of ore carryin silver, lead and copper, and several laterals have been driven, opening v ore bodies of more or less promise. The Eureka shaft, sunk to depth o eral hundred feet, is planned to connect with the tunnel at a depth of Plant is equipped with steam and electric power.

ARGO TUNNEL & MINING CO., LTD. COLO

Dead. Reorganized Nov. 29, 1905, as Argo Transportation & T Co., Ltd.

ARGYLE MINING CO., LTD. ARI

Office: 194 St. Vincent St., Glasgow, Scotland. Letter returne claimed from former mine office, Prescott, Yavapai Co., Ariz. A. Mi secretary. Organized Dec. 29, 1900, under laws of Great Britain, with c ization £100,000, shares £1 par; issued, £66,000. Lands, 2 claims, area 40 known as the Examiner and Mineral Hill, near Huron, Yavapai county zona. Idle for some years.

ARICHISE COPPER CO. ARI

Mine office: Safford, Graham Co., Ariz. J. E. Carpenter, president ganized February, 1907, under laws of Colorado, with capitalization $2,50 Lands are the Buena Vista group, north of Safford, said to have been b for $40,000 and said to show a 6′ vein of low grade copper ore carrying

and gold values, opened by a 100′ shaft and a 530′ tunnel. Shipped a little ore, late 1907.

ARIMEX CONSOLIDATED COPPER CO. **ARIZONA & MEXICO.**

Office: 85 Ames Bldg., Boston, Mass. Chas. H. Dickey, president; C. D. Burrage, secretary. Organized under laws of New Jersey, with capitalization $5,000,000, shares $25 par. Property includes the Copper Prince group of 30 claims, in the Silver Bell district, Pima county, Arizona, held through Oxide Copper Co.; seven-eighths of the stock of the Table Mountain Copper Co., which has 27 claims in the Bunker Hill Mining district of Pinal county, Arizona, and nine-tenths of the stock issue of the Angang Copper Co., which holds about 400 hectares, known as the Chirangangueo mines, near Zitácuaro, Michoacán, Mexico. Neither of the Arizona properties is of apparent promise, but the Mexican claims might be of some value if properly developed. Company was promoted by Thomas W. Lawson, and, like his other copper mining companies, apparently is merely a stock-jobbing scheme.

ARIO COPPER CO. **MEXICO.**

Office: 1525-25 Broad St., New York, N. Y. Mine office: Ario de Rosales, Ario, Michoacán, Mex. Geo. H. Walsh, Jr., treasurer. Lands include La Reina, Bohemia and Flora mines, on the projected line of the Morelia & Tacámbaro railroad, which was under construction at last accounts, and the San Antonio and San Valentin mines, old properties carrying silver and copper ores.

ARISPE MINING & DEVELOPMENT CO. **MEXICO.**

Office: Chicago, Ills. Capitalization $10,000,000, shares $1 par. Supposed to have lands located somewhere in the district of Arizpe, Sonora, Mexico.

ARIZONA AMALGAMATED COPPER CO. **ARIZONA.**

Dead. Was organized, circa 1907, under laws of Maine, with capitalization $15,000,000, shares $5 par; name changed, circa November, 1907, to Copper Company of Arizona. Formerly at Clifton, Graham Co., Ariz.

ARIZONA-APACHE MINING CO. **ARIZONA.**

Office: care of W. J. Guthrie, president, Pasadena, Cal. Mine office: Tucson, Pima Co., Ariz. A. G. Pohndorf, vice-president; Thos. Stafford, superintendent. Organized March, 1907, with capitalization $2,500,000, shares $5 par. Lands, known as the Foran group, are circa 32 miles from Tucson, in the Santa Catalina Mountains. Company plans sinking a double compartment shaft and adding gas power. In December, 1907, Frank Foran, original owner of the ground, took forcible possession. Company dispossessed and practically out of business.

ARIZONA & ARKANSAS LEAD, ZINC & COPPER MINING CO. **ARIZONA & ARKANSAS.**

Dead. Formerly at Gila Bend, Maricopa Co., Ariz. Described Vol. V.

ARIZONA BANNER COPPER CO. **ARIZONA.**

Dead. Formerly at Globe, Gila Co., Ariz. Described Vol. VI.

ARIZONA BELLE MINING CO. **ARIZONA.**

Dead. Formerly at Vail, Pima Co., Ariz.

ARIZONA BLUE BELL COPPER CO. **ARIZONA.**

Dead. Was successor of Butte & Arizona Copper Co., and was succeeded by Arizona Exploration Co. Formerly at Mayer, Yavapai Co., Ariz. Fully described Vol. V.

ARIZONA-BOSTON COPPER CO. **ARIZONA.**

Letter returned unclaimed from former mine office, Globe, Gila Co., Ariz. O. S. Paul, president; J. W. Hawes, treasurer and clerk. Organized May 6, 1907, under laws of Maine, with capitalization $1,500,000, shares $1 par. Lands, 36 claims, in 3 groups, area circa 500 acres, one adjoining the McMillen-Stonewall Mining Co., circa 18 miles northeast of Globe.

ARIZONA CENTRAL COPPER CO. ARIZO

Office: 1304 Keystone Bldg., Pittsburg, Pa. Mine office: Dewey, Ya pai Co., Ariz. Hon. J. F. Wilson, president; J. B. Cleveland, vice-presid and manager; J. M. Elder, secretary; J. W. Norton, treasurer; preceding offic and J. S. Carmichael, directors. Capitalization $2,000,000. Lands, 18 clai area 368 acres, in one group, on the western slope of the Black Hills, 6 mi northeast of Dewey, the nearest railroad station, and 2 miles south of t Yaeger Cañon mine. Property has a contact mineral zone of 800′ to 1,2 claimed width, showing a gossan carrying quartz veins, up to 16′ in width, g ing good assay values in copper, gold and silver. Mine has about 15 openin including the 485′ Shylock incline shaft, said to show, at depth of 230′, a paystreak of black copper sulphide ore, with 7 additional ore bodies of 3′ 8′ width, to depth of 340′, giving good assays in copper, lead, silver and go Has gasoline power. Property considered promising.

ARIZONA-COLORADO COPPER BELT & GOLD MINING & MILLING CO. ARIZON

Office: 305 State Life Bldg., Indianapolis, Ind. Mine office: Globe, G Co., Ariz. Hon. Robt. N. Foree, president and general manager; Chas. H. Jo ner, vice-president; Chas. Trotter, secretary; C. Fenger, Sr., treasurer; J W. Bandhauer, superintendent. Organized September, 1901, under laws Arizona, with capitalization $2,500,000, shares $1 par. Lands, 21 claims, a 400 acres, 3 miles northeast of Globe, showing veins of 3′ to 100′ estima width, carrying auriferous and argentiferous copper oxides and carbona giving assays of 8 to 30% copper, 20 to 50% lead, 1 to 200 oz. silver and to $30 gold per ton. Has 7 pits and shafts, deepest 800′, cutting several su veins and one vein of 40′ estimated width, latter cut at depth of 150′. a 100-h. p. boiler, 1,000′ hoist and 10-drill air-compressor. Has shipped a li ore of fair grade.

ARIZONA COMMERCIAL CO. ARIZO

Dead. Succeeded, 1904, by Arizona Commercial Copper Co. Formerl Globe, Gila Co., Ariz.

ARIZONA COMMERCIAL COPPER CO. ARIZO

Office: 82 Devonshire St., Boston, Mass. Mine office: Globe, Gila Ariz. Nathan L. Amster, president; W. M. Bradley, secretary; R. Town McKeever, treasurer; C. R. Jeffers, assistant secretary and treasurer; pr ing officers, William A. Paine, Charles H. Paine and A. B. Clough, direc J. W. Bennie, general manager; H. A. Collins, superintendent; Patric O'Neil, mine superintendent.

Organized January, 1905, under laws of Maine, with capitaliz $2,500,000, increased, 1908, to $3,000,000, shares $25 par. Has authoriz issue of $500,000 of 6% bonds, convertible into stock at $20. It is plann devote $300,000 from the bond issue to the erection of a smelter, balance o ceeds going to working capital. Annual meeting, second Wednesday in Ja Shares are listed on the Boston stock exchange. American Loan & Tru Boston, transfer agent. Federal Trust Co., Boston, registrar.

Lands, 11 claims, 3 fractional, in 2 groups, known as the Black Haw Copper Hill mines, separated by the Iron Cap mine of the National M Exploration Co., in Copper Gulch, circa 2 miles from Globe, lying just of the Old Dominion and adjoining the United Globe and Superior & Bo mines. The property has large bodies of low grade carbonate ore, but cipal values, as developed, are in sulphide ores of medium and high grade

The Copper Hill mine has an 800′ shaft showing a vein up to about in width, with a 5′ paystreak assaying about 4% copper, and is connec underground with the Gray mine of the Old Dominion. There are sev

operations on silicious surface ores, and about 15,000 tons of such ores have been shipped.

Principal developments are on the Black Hawk mine, where there are 2 shafts, one being a 3-compartment 500′ shaft. The Black Hawk has a surface capping of low-grade iron ore, above a 45′ vein of silicious ore estimated to average about 4% copper, with excess of iron. There also is a hematite vein of 3′ to 4′ width, giving assays of 4.5% copper, with small silver values. At depth the vein is larger, being up to 60′ in width on the 400′ level, and carrying sulphide ore of 6 to 7% copper tenor.

Railroad connections were secured March, 1907, when active shipments were begun, and in six months the company shipped about 25,000 tons of ore returning about $7.50 per ton, after deducting freight and smelting charges. Production was suspended September, 1907, on account of the drop in the price of copper. The Black Hawk mine shipped about 500 tons of high grade ore for test purposes in 1907. Mr. Amster estimates an average extraction of about 7% copper from Black Hawk ores, at a cost of 6.5 cents per pound. Cash on hand, Dec. 31, 1907, was $51,106.61; supplies, $22,440.17; accounts receivable, $5,900.38, as against about $6,000 actual liabilities. Production, 1906, was 939,102 lbs. fine copper, and for 1907 was 1,638,610 lbs. fine copper and 1,644 oz. fine silver.

The company plans erecting a reduction plant of about 300 tons daily capacity, and estimates that $3.50 per ton can be saved by doing its own smelting. The company has a strong management financially, and is being developed vigorously.

ARIZONA CONSOLIDATED COPPER MINES, LTD. ARIZONA.

Office: Throgmorton House, Copthall Ave., London, E. C., Eng. Mine office: Clifton, Graham Co., Ariz. Hon. H. A. Stanthorpe, director; W. Fairhall, secretary. Organized June 17, 1899, under laws of Great Britain, with capitalization £150,000, shares £1 par. Lands include claims in the Copper Mountain district, also a millsite on the San Francisco River, former said to show veins of 5′ to 10′ width carrying a considerable variety of copper ores of different grades. Idle at last accounts, except for endeavors to raise money for a 50-ton smelter.

ARIZONA CONSOLIDATED GOLD & COPPER CO. ARIZONA.

Office: Phoenix, Ariz. Mine office: Winkelman, Gila Co., Ariz. Employs 4 men. H. B. St. Claire, president; J. S. Miller, vice-president; H. H. McNeil, secretary and treasurer; S. G. Gardom, superintendent. Organized June 12, 1907, under laws of Arizona, with capitalization $5,000,000, shares $1 par. Lands, 3 claims, area 380 acres, held by location, also a 20-acre millsite, showing numerous fissure veins, of which 4, under development, are said to average 6′ width. Property has several pits of 10′ to 15′, shafts of 70′, 32′, 50′, 40′, and a 40′ tunnel.

ARIZONA CONSOLIDATED MINING CO. ARIZONA.

Office: 1420 Chestnut St., Philadelphia, Pa. Mine office: Johnson, Cochise Co., Ariz. Alfred S. Miller, president; Jas. W. Stetson, secretary and treasurer; Samuel J. Entrikin, general manager; Hale McCormick, mine superintendent. Organized July 21, 1904, under laws of Delaware, with capitalization $1,000,000, shares $1 par, in $300,000 of 6% preferred stock and $700,000 of common stock. Is operated as a close corporation.

Lands, 12 claims, area 240 acres, 7 miles northwest of Cochise, formerly owned by Russell Consolidated Copper Co., showing 5 ore bodies, of which 3, under development, range 4′ to 6′ in average width, carrying carbonate and sulphide ores, estimated by company to average 8% copper and 1.2 oz. silver per ton. Sulphide ore was encountered at depth of 671′. Property is opened by 6 shafts. Lands include the Mammoth and New Republic groups, latter

opened to depth of about 700′, with circa one mile of workings. moth mine is about 350′ deep. Both properties are equipped with po The Russell Consolidated shipped, 1880-1882, considerable quantiti carbonate ores, of about 30% average copper tenor. Production, 245,040 lbs. fine copper, and 3,122 oz. fine silver, valued at $51,057.0

ARIZONA COPPER CO., LTD.

Office: 29 St. Andrews Square, Edinburgh, Scotland. Mine offi Graham Co., Ariz. Employs circa 2,000 men. John Gill, chairma Hopkins, managing director; preceding officers, Col. J. Bald Harvey, J. P., Lord Salvesens, G. Readman, Alex McNab, J. P., and J. Wilson Norman C. Carmichael, assistant general manager; Wm. Exley Miller, Robert Addie, consulting engineer; Geo. Fraser, smelter superintend bald Morrison, mill superintendent; C. D. Clark, mechanical engine

Organized Aug. 5, 1884, under laws of Great Britain, with ca £755,000, of which £736,504 is issued, as follows: £40,000 in 160,00 ence shares, 5s. par, upon which no calls have been made, but £7,8 paid in advance; £316,530 (part of £320,000) in full paid prefere £316,530 (part of £320,000) in 1,266,120 shares of fully paid prefe shares 5s. par; and £63,440 (part of £75,000) in 253,776 shares of deferred stock, shares 5s. par. Profits are divided as follows: 10 tive dividend on A preference shares, 7% cumulative dividends on shares, 10% non-cumulative dividends on preferred ordinary shares, cumulative dividends on deferred shares; balance, if any, to be d rata between preferred ordinary and deferred ordinary shares. I £175,210 terminable 5% bonds outstanding. Fiscal year ends Sep fiscal year ending Sept. 30, 1907, mining profits were £351,650 a profits were £129,070, dividends being £24,531 on preferred shares a on ordinary shares, with £108,000 credited to reserve capital outlay credited to surplus. About 20% of the stock issue is held in States.

Lands are circa 4,000 acres, including 8 producing mines, n Metcalf, Longfellow, Garfield and Coronado, in Graham county, Ariz as produced, give average returns of about 3.5% copper, production b 10% smelting ore and 90% concentrating ore. Mines, except the are developed to a depth of about 500′ only, being opened mainly giving cheap extraction. Notwithstanding the comparatively shall development a tremendous amount of ore is in sight, ore reserves, M being estimated at 10,370,600 tons practically in sight.

The Humboldt mine, which is the largest producer, shows a lar low grade disseminated chalcocite. Extraction from this property open-cast, but mainly through tunnels equipped with electric lights a traction. The haulage system uses the overhead trolley, power being by a 150-h. p. Crossley gas-engine, driving a 100-h. p. generator tha a 225-volt current. Electric locomotives of 10-h. p. haul 40-ton loa having a single track laid with 10-lb. rails, running 600′ directly t mountain, with a loop reaching all workings of the Humbolt mine, running through International Hill direct to the new concentrator.

The Longfellow mine is the oldest important copper producer having been opened circa 1877. A 1,300′ tunnel driven from Chase nects with a 600′ blind shaft, obviating about 3 miles of railroad ha bad grades. The Longfellow Extension mine is developing satisfact

The Metcalf group, 7 miles from Clifton, is worked open-cast, extensive producer of low grade oxidized ores, which are concent the sulphide ores from the Humboldt and Yavapai groups.

The Coronado group, 9 miles from Clifton, has 3 shafts, deepes

latter having found, at a depth of 700′, in the granite, an ore body of about 5% copper tenor, apparently disproving the claim that all ore values are cut off at about 500′ depth. The Coronado group shows considerable high grade ore.

The Clay mine, which was but a small producer in the past, has been developed to important dimensions, and shows a large tonnage of low and medium grade ore.

Ore is taken from the different mines by 6 gravity tram-lines to storage bins on the Coronado railroad, whence hauled to the reduction plant at Clifton. The Coronado railroad is of standard gauge for 4 miles, from Clifton to Longfellow, and is of 36″ gauge for 3.2 miles, from Longfellow to Metcalf, the road having 30-ton ore cars. The company also operates the Arizona & New Mexico railroad, a highly profitable standard-gauge line of 107 miles, running from Clifton to Hachita, N. M., where connection is had with the El Paso & Southwestern.

The mines and works use about 3,000 h. p., supplied in about equal portions from steam, gas and distillate engines. The gas-engine plant is exceptionally complete and effective. It has been planned to develop hydro-electric power and transmit same from a dam about 50 miles distant.

The works at Clifton, Morenci, Longfellow and Metcalf, being somewhat scattered, were remodeled and enlarged 1902, 1904 and 1905, now including 6 concentrators, a smelter, leaching plant and acid plant. The concentrators, having about 2,400 tons combined daily capacity, are operated by gas and electric power, putting 6.6 tons of crude ore into one ton of concentrates. No. 6 concentrator, put into commission July, 1906, is the largest, having about 900 tons daily capacity. The building, of steel, is equipped with two 600-ton crushers and a 250-h. p. Nordberg engine direct-connected to a 125-h. p. dynamo, steam being furnished by three 400-h. p. Stirling boilers. No. 6 mill has a large settling basin, from which tailings are removed and filled into the mine. Chase creek was dammed to prevent tailings going into the Frisco river, and thence into the Gila river, as they caused considerable damage to farmers and ranchers, but the damming of Chase creek brought about floods that have caused great damage to the company and to the village of Clifton, hence, in 1908, a pipe-line was built to carry the tailings and discharge same on the flat, several miles down stream. Milling equipment at the various concentrators includes 2 Hancock jigs, installed 1905, handling 600 tons daily, which replace 36 Frue Vanners, 2 Wilfley tables and 8 other machines. The Hancock jigs are highly economical of floor space and require little water. There also are Allis-Chalmers high-speed rolls for crushing and Huntington mills for regrinding.

The smelter is of steel frame with slate roof and floor of iron plates laid in cement. There are six 300-ton water-jacket blast-furnaces, each 39x240′ at the tuyeres, with blast supplied by Nos. 7, 9 and 10 Connersville blowers, operated by a 275-h. p. engine. Gases from the blast-furnaces pass through a 480′ flue and 300′ stack. Slag settlers are 7x14x3′, with a 6″ fire-brick lining. Matte of 50 to 55% copper tenor is charged into the converters by a 10-ton ladle, handled by a 30-ton electric crane. The conversion plant has 3 stands and six 7-ton shells, with a daily capacity of 50 tons of 99.5% blister copper. Disintegration of slag by running water has been discontinued, and molten slag again is handled in ladle cars, by a steam locomotive. A 25-ton briquetting plant was built, 1905, using coal breeze for a binder, under 2,000 lbs. pressure per square inch. Plant is entirely automatic, fines going in at one end and briquettes being loaded upon cars at the other.

The acid plant makes about 3,000 tons of sulphuric acid yearly from the fumes of the roasters, the entire product being used in the leaching plant,

which treats an average of about 250 tons of low grade oxidized ores
In connection with the leachery there is a 125-ton bluestone plant, turn
bluestone equivalent to about 3,000,000 lbs. fine copper yearly. This is
the most successful leaching plant in the United States, and the mana
is entitled to credit therefor.

Miscellaneous enterprises include a well equipped foundry, machin
sawmill, planing mill and 20-ton ice plant, all built of brick. The c
also has general merchandise stores at Clifton, Longfellow and Metca
a good library and reading room are maintained for employes.

High water mark in production was reached in 1904, with an ou
32,197,760 lbs. of fine copper; output of 1907 amounting to 30,794,092
copper, valued at $6,150,050. A recent change in management, by whi
Hopkins was put in charge of the property, is expected to result, eve
in increased production. The management has been criticized freely for
shortcomings, but some of these criticisms seem to have been founde
upon prejudice against the British management than upon reasonable g
While there are doubtless opportunities for improvements in various dir
it should be borne in mind that the Arizona has been a large and
profitable producer of copper for many years, and that its ore bodies
extensive, are low in average tenor. Under these circumstances the m
ment has made a decidedly creditable record.

ARIZONA COPPER BELT MINING CO. ARI

Office: 612-25 Broad St., New York, N. Y. Mine office: Conste
Yavapai Co., Ariz. Wm. J. Dilthey, president; Alex. McNear, vice-pr
and secretary; Chas. H. Peckworth, treasurer; E. G. Straub, general m
preceding officers, J. P. Rappold and Wm. A. Garrison, directors; H
Jones, superintendent. Organized February, 1906, under laws of Arizon
capitalization $1,000,000, shares $1 par. Lands, 11 claims, area 220 acres,
ing the Wren and Texas groups, in the Black Rock district, said to
4′ to 22′ fissure in granite-porphyry, traceable 2,000′, each claim having
shafts, 2 deepest circa 115′ each. Eight claims carry mainly gold val
to $48 per ton, and 3 claims carry principally ore assaying 8 to 17%
0.83 oz. silver and circa $10 gold per ton. Has gasoline power. App
more attention has been devoted to company's financing than to dev
ore.

ARIZONA COPPER CHIEF SMELTING CO. ARI

Office: 714 Hartford Bldg., Chicago, Ills. Claimed July, 1906, t
hundreds of tons of copper glance in sight. Location of lands unknow

ARIZONA COPPER-GOLD MINES CO. ARI

Office: 1011 Pabst Bldg., Milwaukee, Wis. Mine office: Prescott,
pai Co., Ariz. Employs 12 men. R. H. Burmister, president and gener
ager; Chas. McKenney, vice-president; F. E. Wildish, secretary; F. L.
treasurer; preceding officers, C. N. Smith, W. V. Jones, A. S. Duffies,
Howell and T. S. Norris, directors; J. S. Sheehan, superintendent. Or
Oct. 12, 1903, under laws of Arizona, with capitalization $1,000,000, as
Gold-Lode Mines Co., and reorganized Apr. 10, 1906, under present titl
capitalization $1,500,000, shares $1 par.

Lands, 17 claims, area 340 acres, in the Cherry Creek district, c
miles northeast of Humboldt. Development is by several shallow sha
short tunnels with circa 3,500′ of workings, on a 2′ fissure vein, repo
company's engineer to give 17,329 tons of ore in sight. Ore apparentl
ages about 2% copper, with gold values. Has a 40-h. p. steam hoist, g
1,000′ depth, with 4 mine buildings, including a 10-stamp mill. Mana
plans sinking shafts to 1,000′ depth. Company was promoted by Pierce
wood, and advertised extensively, some very wild statements being m

the advertisements. At last accounts company was indebted to its general manager and superintendent.

ARIZONA COPPER & GOLD MINING CO. **ARIZONA.**

Letter returned unclaimed from former office, Phoenix, Ariz. Mine office: Salome, Yuma Co., Ariz. Company owns a 20% stock interest in the Savage Gold & Copper Mining Co. Lands, 5 claims, unpatented, in the Harcúvar Mountains, having a 55′ tunnel showing a 5′ vein of auriferous copper ore, and a 320′ shaft bottomed in a vein of circa 20′ width carrying malachite and chalcopyrite. Is claimed to have about 1,000 tons of smelting ore on the dump.

ARIZONA COPPER HILL MINING CO. **ARIZONA.**

Dead. Property sold under foreclosure. Formerly at Oracle, Pinal Co., Ariz. Described Vol. VI.

ARIZONA COPPER MINING CO. **ARIZONA.**

Office: care of Geo. H. Parker, secretary and treasurer, Los Angeles, Cal. Mine office: Tucson, Pima Co., Ariz. E. C. Griffith, president; Louis F. Fletcher, vice-president; preceding officers and P. G. Turner, directors; B. C. Brechta, superintendent. Lands, 20 claims, in the Tucson Mountains, having a 400′ tunnel, said to show an 8′ vein carrying ore of good grade. Presumably idle.

ARIZONA COPPER MOUNTAIN MINING CO. **ARIZONA.**

Office: care of B. T. MacMasters, secretary and treasurer, First National Bank Bldg., Chicago, Ills. Organized Jan. 25, 1901, under laws of Utah, with capitalization $1,000,000, shares $1 par. Lands, 6 claims, area 120 acres, in process of patenting, 25 miles from a railroad, in the Copper Mountain district of Mohave county, Arizona, developed by 4 shafts, deepest 200′, and a tunnel of 183′, with a total circa 1,500′ of underground openings, showing 5 veins of 2′ to 30″ width, carrying oxide and carbonate ores, with a little chalcocite, giving good assays in copper, with gold values of $1.20 to $8.90 per ton. Presumably idle.

ARIZONA COPPER MOUNTAIN MINING CO. **ARIZONA.**

Dead. Title changed, 1904, to Copper Butte Mines. Formerly at Phoenix, Maricopa Co., Ariz.

ARIZONA COPPER PLACER MINING & MILLING CO. **ARIZONA.**

Mine office: Quartzite, Yuma Co., Ariz.

ARIZONA COPPER QUEEN MINING CO. **ARIZONA.**

Office: New York Life Bldg., Kansas City, Mo. Mine office: Mayer, Yavapai Co., Ariz. Shannon C. Douglas, president; Edwin Herrider, secretary; Ernest J. White, treasurer; Wm. Burr Douglass, general manager; preceding officers and H. C. Crowell, directors; John McIlwhee, superintendent. Organized July 24, 1907, under laws of Arizona, with capitalization $5,000,000, shares $1 par. Lands, 6 claims, on Copper Creek, circa 25 miles southeast of Mayer, claimed to show 10 practically parallel veins, carrying ore assaying 6 to 84% copper, 2 to 57 oz. silver and $10 to $100 gold per ton. Development is by various trenches and by shafts of 30′, 30′, 35′, 40′, 60′ and 90′. Has a power plant with air-compressor. Suspended operations circa November, 1907, but planned resumption 1908.

ARIZONA COPPER SMELTING CO. **ARIZONA.**

Office: care of L. C. Miller, vice-president, Los Angeles, Cal. Letter returned unclaimed from former mine office, Kelvin, Pinal Co., Ariz. Dr. O. B. Bachman, president; Chas. H. Peck, secretary and treasurer; preceding officers and Edw. A. Hill, directors. Dr. O. B. Bachman, the president, cannot be located at former addresses in Los Angeles or New York; H. M. Sorrick, understood to be a director, says that he is not, and Chas. H. Peck, formerly secretary and treasurer, says he has resigned. William R. de Grouchy & Co., of Boston, the fiscal agents, have disappeared. Organized under laws of Arizona, with capitaliza-

tion of $1,000,000, shares $10 par. Lands, said to be 20 claims, area circa 4(acres, on the western slope of the Pinal Mountains, 12 miles northeast of Ke vin, including the Bobtail, Black Jack and Brooklyn groups, having a 21 shaft, said to be bottomed in a 9′ vein and claimed to have 1,800′ of working with alleged ore blocked out valued at $1,120,000, which is more than doub ful. The Bobtail mines are considered valuable, and some of the officer enjoy good local standing, but the company apparently is merely a bit o stock-jobbery.

ARIZONA COPPER SYNDICATE. ARIZONA

Dead. Succeeded, Dec. 29, 1903, by Clifton Copper Mines, Ltd. Formerl at Clifton, Graham Co., Ariz.

ARIZONA COPPER SYNDICATE, LTD. ARIZONA

Dead. An English twin of the Arizona Copper Syndicate. Formerly a Clifton, Graham Co., Ariz.

ARIZONA COPPER SYNDICATE OF PROVIDENCE. ARIZON

Office: 171 Westminster St., Providence, R. I. Mine office: Pearce, C chise Co., Ariz. T. F. Gilbane, trustee and manager. Organized Februar 1907, by a pool of old shareholders of the Copper King of Arizona, a conce of evil reputation and frequent reconstructions, which lost its property, un foreclosure, Aug. 28, 1905. Lands, 28 claims, 17 patented, and 2 millsit Mine has a 225′ incline shaft, with about 350′ of tunnels, showing some of good tenor. Smelter, having a 30-ton water-jacket blast-furnace, has b idle since 1902. Property is idle and company is desirous of selling out.

ARIZONA DIAMOND DRILL MINING DEVELOPMENT CO. ARIZO

Office: 313 West Second St., Los Angeles, Cal. Hon. Owen McAleer, p ident; Dr. Wm. Dodge, first vice-president; A. W. Bruner, second vice-p dent; J. S. Van Doren, secretary; Edwin F. Hill, treasurer; Oscar Rein general superintendent. Organized under laws of Arizona. Owns a con ing interest in the Cashier Copper Mining Co., and is said to have an op on the McClure North Extension property, in the Bully Hill district of S county, California. Is well equipped with diamond drills, and does a ge drilling business, under the management of Mr. Reinholt, a practical ma experience.

ARIZONA & EASTERN MINES & POWER CO.

Office: 6-135 Grand Ave., Milwaukee, Wis. J. O. Buckley, president treasurer; Henry R. Buckley, vice-president; Thos. T. Somers, secretary; ald Ferguson, general manager and consulting engineer. Capitaliz $7,500,000, shares $100 par. Company advertises that it wishes to pur mining properties in Arizona or Sonora. No trace of operations.

ARIZONA & EASTERN MINING CO. ARIZO

Office: 637 Endicott Bldg., St. Paul, Minn. Mine office: Globe, Co., Ariz. W. H. Sisson, president; T. W. Teasdale, vice-president; Maj. L. DeLestry, secretary and general manager; preceding officers, A. C. Osbor W. H. Ulmer, Otto Bremmer and M. P. Ryan, directors. Organized Dece ber, 1905, under laws of District of Columbia, with capitalization $1,500,0 shares $1 par. Lands, 19 claims, area 380 acres, with a 20-acre millsite a 60 acres miscellaneous lands, in the Globe and Kelvin districts, including t Patterson group of 6 claims in the Mineral Creek district, some miles west Globe. Properties are said to show 3 veins, of which one, under developme is reported as of 7′ average width, traceable 3,900′, ore being reported to car an average of 2% copper, up to 50 oz. silver and $2.25 gold per ton, in cove lite, bornite and chalcopyrite. Development is by a 181′ tunnel and by shaf of 120′, 165′ and 114′, with a total of 613′ of workings, estimated by compan to put 116,000 tons of ore in sight, which estimate is excessive. Equipmen includes a 500′ hoist and 5 buildings.

ARIZONA, EASTERN & MONTANA SMELTING & ORE PURCHASING CO. MONTANA.

Dead. A swindle, promoted by the notorious parson-swindler, Dr. R. C. Flower.

ARIZONA-ECHO COPPER MINING CO. ARIZONA.

Office: Pasadena, Cal. Mine office: Planet, Yuma Co., Ariz. Organized 1906, under laws of Arizona, with capitalization $1,000,000, shares $1 par. Lands are sundry claims near the Signal mine, on the Bill Williams Fork River.

ARIZONA & ELY COPPER CO. ARIZONA.

Office: 704 Citizens National Bank Bldg., Los Angeles, Cal. Mine office: Wickenburg, Maricopa Co., Ariz. Frank Newnham, president; I. M. Lyle, secretary; M. A. Proper, treasurer. Organized 1906 with capitalization $3,000,000, shares $1 par. Lands, 3 claims, unpatented, 12 miles northeast of Wickenburg, said to carry 2 veins showing oxidized and sulphide copper ore, opened by 150' of tunnels and drifts, also 2 claims near Ely. At last accounts company was offering stock at one cent per share. Idle. Is not regarded favorably.

ARIZONA EXPLORATION CO. ARIZONA.

Mine office: Mayer, Yavapai Co., Ariz. R. D. F. Johnson, superintendent. Company is composed mainly of shareholders of the Arizona Smelting Co. and also is closely connected with the De Soto Mining Co. Property is the Blue Bell group, connected with the Prescott & Eastern Railway by aerial tram. The group of 3 claims has 3 fissure veins in Algonkian slates, with quartzite footwall and grano-diorite hanging, developed by 6 shafts, deepest 300', and by tunnels of 70' and 75', showing cuprite, malachite and chalcopyrite, all slightly argentiferous and auriferous, with a large ore body opened on the 300' level. Machinery is actuated by electric power, carried by a 10-mile transmission line.

ARIZONA EXPLORATION & DEVELOPMENT CO. ARIZONA.

Letter returned unclaimed from former office and mine, Globe, Gila Co., Ariz. S. L. Gibson, president; G. S. Van Wagenen, vice-president. Organized under laws of Arizona, with capitalization $1,000,000, shares 10 cents par. Lands, 5 groups, area 850 acres.

ARIZONA GIANT COPPER CO. ARIZONA.

Office: 229 Byrne Bldg., Los Angeles, Cal. Letter returned unclaimed from former mine office, Ehrenburg, Yuma Co., Ariz. R. M. Furlong, president; H. Franklyn Hiller, secretary and treasurer. Capitalization $3,000,000, shares $1 par. Lands, 320 acres. Old management, which sold considerable stock, at fancy prices, was ousted, September, 1903. Moribund.

ARIZONA GOLD & COPPER CO. ARIZONA.

Mine office: Winkelman, Gila Co., Ariz. Organized circa January, 1908, under laws of Arizona, with capitalization $500,000, by Chas. Baner and C. A. Baner—presumably the right and left. Lands are 6 miles northeast of Winkelman, near the Saddle Mountain mine. Presumably idle.

ARIZONA GOLD & COPPER CO. ARIZONA.

Dead. Lands sold, January, 1907, to Trenton Mining Co. Formerly at Patagonia, Santa Cruz Co., Ariz. Fully described Vol. VI.

ARIZONA GOLD & COPPER MINES CO. ARIZONA.

Dead. Formerly at Wickenburg, Maricopa Co., Ariz.

ARIZONA GOLD & COPPER MINING CO. ARIZONA.

Dead. Formerly at Prescott, Yavapai Co., Ariz.

ARIZONA GOLD & COPPER REDUCTION CO. ARIZONA.

Dead. A swindle, perpetrated by the notorious Theodore Stegner. Lands were claimed to be in Yuma and Mohave counties, Arizona.

ARIZONA GOLD LODE MINING CO. ARIZO

Dead. Reorganized, circa 1906, as Arizona Copper-Gold Mines Co. merly at Humboldt, Yavapai Co., Ariz.

ARIZONA GOLD MINING CO. ARIZO

Mine office: Clifton, Graham Co., Ariz. Wood Poland, superintend Has gold and copper ores, with steam power.

ARIZONA GOLD MINING CO. ARIZO

Dead. Formerly at Wickenburg, Maricopa Co., Ariz.

ARIZONA GOLD MINING & DEVELOPING CO. ARIZO

Office: 706-140 Dearborn St., Chicago, Ills. Mine office: P. O. Box Bisbee, Cochise Co., Ariz. E. C. Reichwald, president. John M. Dunphy, president; Wm. E. Blakemore, treasurer; Geo. A. Smith, secretary; S. Me superintendent. Capitalization $2,500,000. Lands, in Tombstone Cañon, the divide, are slightly developed by tunnel.

ARIZONA GOLD MINING & MILLING CO. ARIZO

Dead. Formerly at Briggs, Yavapai Co., Ariz.

ARIZONA-HANCOCK CONSOLIDATED MINING CO. ARIZO

Office: Hancock, Mich. Mine office: Florence, Pinal Co., Ariz. Jo Cuddihy, president; Alfred C. Sieboth, vice-president and superinten Henry L. Baer, secretary and treasurer. Organized Mar. 26, 1903, under of Arizona, as successor to the Arizona & Hancock Mining Co., with capit tion $500,000, shares $10 par. Annual meeting, first Tuesday after first day in March. Lands, 4 claims, patented, 2 miles south of Superior, sh a vein traversing two claims parallel to the vein of the Lake Superior & zona, with diabase footwall and limestone hanging, opened by a short t and a winze of 55′, with drifts on two levels, showing lead above and c below. Idle for some years.

ARIZONA & HANCOCK MINING CO. ARIZ

Dead. Succeeded, March 26, 1903, by Arizona-Hancock Consolidated ing Co. Formerly at Florence, Pinal Co., Ariz.

ARIZONA HERCULES COPPER MINING CO. ARIZ

Office: 386 Pacific Electric Bldg., Los Angeles, Cal. Mine office: K Pinal Co., Ariz. W. T. Dunham, president; Wm. Bayly, vice-president; Thomas, secretary and treasurer; preceding officers, R. H. Reid and Cl K. McCornick, directors. Organized September, 1906, under laws of A with capitalization $10,000,000, shares $10 par. Lands, on Mineral creek the Ray and Silver King mines, about 7 miles from Kelvin, are slight veloped by shaft and diamond drill borings.

ARIZONA LE ROI COPPER MINING CO. ARIZ

Office and mine: Kingman, Mohave Co., Ariz. J. N. Turrentine, pres W. H. Bradley, vice-president; preceding officers, W. S. Shafer, Geo. H. Francis M. Townsend and J. H. Sampson, directors; Maj. W. A. Mensch, tary and treasurer. Organized Nov. 17, 1906, with capitalization $1,0 shares $1 par. Lands, 6 claims, well watered and timbered, adjoining t terprise mine, circa 18 miles from Kingman, with good wagon road to 1 mile. Has about 400′ of openings, showing carbonate ores.

ARIZONA MERCANTILE, TRANSPORTATION & SMELTING CO. ARIZ

Office: Leavenworth, Kans. Mine office: Casa Grande, Pinal Co., Capitalization 1,000,000 shares, presumably $1 par. Lands, 5 claims millsite, near Casa Grande, with a 20-stamp mill and a 50-ton smelter. regarded favorably.

ARIZONA-MEXICAN COPPER CO. MEX

Office: Phoenix, Ariz. Mine office: Caborca, Altar, Sonora, Mex. Hubinger, president; W. E. Defty, vice-president and consulting engi W. C. Foster, treasurer; C. T. Vincent, superintendent. Organized Feb

1902, under laws of Arizona, with capitalization $3,000,000, shares $10 par. Lands, 79 pertenencias, known as La Gran Provedora de Cobre, 75 miles from the Sonora Railway. Country rock is granite, ores carrying an iron and spar gangue, giving a self-fluxing ore. Vein is up to 228′ wide, giving average assays of 6.7% copper, 12 oz. silver and $2 gold per ton, and is opened by shafts of 102′ and 200′, and by tunnels of 209′ and 228′, with a total of about one-half mile of openings. From the 400′ level down some ore bodies assayed 22% to 30% copper and as high as 131 oz. silver per ton. Management is good and property is considered promising.

ARIZONA-MEXICAN MINING & SMELTING CO. **ARIZONA & MEXICO.**

Office: Allentown, Pa. Works office: Needles, San Bernardino Co., Cal. Dr. H. K. Hartzell, president; H. H. Godshall, secretary and treasurer; Dr. L. D. Godshall, general manager and resident director; Saml. Fields, mine superintendent. Organized Dec. 6, 1904, under laws of Arizona, with capitalization $2,500,000, shares $10 par.

Lands include property formerly held by the W. S. Fletcher Mining & Smelting Co., holdings including mining properties at Siam, California; Cerbat and Kingman, Arizona, and 16 idle claims near Florence, Pinal County, Arizona. The Valley Wells mine produced a little copper ore in 1906. The Stockton Hill or Banner mine, 12 miles north of Kingman, opened by a tunnel of circa 1,000′ length, has silver-lead ore, slightly auriferous, of good average tenor. The Infallible mine is said to show a 20′ vein of high grade ore.

The smelter, remodeled and slightly enlarged to about 125 tons daily capacity, is well designed and equipped, though small, having both lead and copper stacks, with a six-hearth McDougal calciner and a 100′ steel smoke-stack. The lead furnace is 46x120″, with No. 6 Connersville blower and 65-h. p. engine. Works include a small but complete sampling mill, 35x37′ in size, and are well located to serve a district having numerous small mines with rich ores, in which there is no smelter. Lead mines were idle at last accounts, but planned early resumption.

ARIZONA & MICHIGAN DEVELOPMENT CO. **ARIZONA.**

Office: Benson, Ariz. Mine office: Johnson, Cochise Co., Ariz. A. J. Pidgeon, president and general manager; Hon. Stephen Roemer, secretary and treasurer; Mortimer Wien, superintendent. Organized 1904, under laws of Arizona, with capitalization $2,500,000, shares $5 par. Lands, 7 claims, patented, area 140 acres, showing porphyry and limestone carrying 4 ore bodies, 1 under development by vertical and incline shafts and by tunnels, showing a 7′ vein with poorly defined walls and impregnations in the limestone hanging and porphyry footwall. Has a 150′ two-compartment main shaft. Ores are cuprite, malachite and copper sulphides giving average assays up to 12% copper, 18 oz. silver and $1 gold per ton. Has a 60-h. p. gasoline engine with double-drum hoist, and has shipped a little good ore to El Paso smelter.

ARIZONA MINE. **WYOMING.**

Office and mine: care of Horace E. Adams, owner, Hecla, Laramie Co., Wyo. Lands, 4 claims, area 80 acres, in the Silver Crown district, opened by a 100′ shaft and tunnels of 100′, 100′, and 120′, showing native copper, oxides, carbonates, chalcocite and chalcopyrite. Has gasoline power and a small leaching plant.

ARIZONA MINES CO. **ARIZONA.**

Mine office: Casa Grande, Pinal Co., Arizona. C. L. Shaw, superintendent, at last accounts. Idle.

ARIZONA MINING CO. **NEW MEXICO.**

Office: 311 Pozzoni Bldg., St. Louis, Mo. Letter returned unclaimed from former mine office, Pinos Altos, Grant Co., N. M. Apparently moribund.

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HANDBOOK.

INVESTMENT CO.

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Described Vol. V

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Ariz.

CO.

St. Louis.

secretary and treasurer, Salt
Ariz. W. H. Jones, presi
Geo. B. Weaver, J. F. Harding
with capitalization $1,000,00
Antelope group.

COPPER CO.

Co., Ariz. Described Bul

CO.

Mich.

Boston, Mass.

Paul S. Wheeler, secret
Bisbee, Ariz. Vice-president

secretary; M. H. C. Vedder, assistant secretary. Organized Nov. 20, 1903, under laws of Arizona, with capitalization $1,000,000, shares $5 par. Direct title to lands is held through the Moctezuma-Arizpe Development Co., S. A., organized under laws of Mexico. Chicago Title & Trust Co., registrar and transfer agent. Annual meeting, last Monday in January.

Lands, 6 groups, area circa 27,000 hectares, in the Manzanal Mountains, 15 miles southeast to 17 miles northeast of La Cananea, the nearest railroad point, and about 2½ miles from the Sonora River, with a good wagon road from the mine to the river. Lands have been divided by the company into 25 full blocks of 1 square kilometer each, and 5 fractional blocks.

Principal property is the Alacran mine, area 75 hectares, showing ore at the contact of quartz-porphyry with andesite, in a vein of 3′ to 4′ width, carrying mainly gold and silver values, with lead and some copper, having produced ore assaying up to $270 per ton in values.

The Rey del Cobre mine, area 125 hectares on Block 21, shows low-grade copper ore.

The Palo Seco mine, area 86 hectares, on Block 11, has a tunnel said to show a ledge of about 200′ width, carrying some high-grade silver, lead and copper ore, and second-class argentiferous ore of about 4% copper tenor.

The Manhattan mine, area 2,274 hectares, on Blocks 15 and 16, shows native copper.

Miscellaneous holdings include La Victoria mine and La Sevilla mines, area 24 hectares each, and La Princessa mine, area 15 hectares.

The property is one of considerable promise.

ARKANSAS & ARIZONA COPPER CO. **ARIZONA.**

Office and mine: Jerome, Yavapai Co., Ariz. J. T. Robertson, president; Chas. T. Lynch, vice-president; Walter C. Miller, treasurer; Ralph A. Smith, secretary; J. E. Leeper, general manager; preceding officers, W. M. Kavanagh and S. P. Part, directors. Organized June 25, 1906, under laws of Arizona, with capitalization $1,500,000, shares $1 par. Lands, 14 claims, area 280 acres, known as the Royal Irish group, in the Verde district, having a 552′ shaft, sunk through alluvium, carrying a little gold, shaft evidently being sunk in a deep basin. Has a 50-h. p. Leyner hoist, good for 1,500′ depth, and an 8-drill Rand air-compressor, with 30x40′ power-house and 7 miscellaneous buildings. Officers stand well locally.

ARKANSAS MINING CO. **MONTANA.**

Letter returned unclaimed from former mine office, Helena, Lewis and Clark Co., Mont. Lands, 2 miles west of the summit of Mount Helena, show a vein traceable 800′, assaying well in copper, with small gold and silver values.

ARKANSAS VALLEY SMELTING & REFINING CO. **COLORADO.**

Works office: Leadville, Lake Co., Colo. Is controlled by the American Smelting & Refining Co.

ARLINGTON-BURNS COPPER-GOLD CO., LTD. **BRITISH COLUMBIA.**

Dead. Formerly at Greenwood, Boundary district, B. C. Described Vol. VI.

ARLINGTON COPPER CO. **NEW JERSEY.**

Dead. Lands, at Arlington, Hudson Co., New Jersey, sold Sept. 30, 1903, for debt. Described Vol. II.

ARLINGTON MINING CO. **MONTANA.**

Office and mine: Mullan, Shoshone Co., Idaho. Organized under laws of Idaho. Lands, 30 claims, in the Mountain House unorganized mining district of Sanders county, Montana, showing ores said to give good average assays in copper, and to carry up to 6% lead.

ARLINGTON MINING CORPORATION. **WASHINGTON.**

Letter returned unclaimed from former mine office, Conconnully, Okanogan Co., Wash. Mine has a shaft, and an old crosscut tunnel nearly 1,000′ in length,

planned to give a 400′ back, showing auriferous and argentiferous copper o with some native silver, copper being in small percentages, but increasing wi depth. Has gasoline power and an air-compressor. Idle and presumab moribund.

FRANCISCO ARMENDAIZ SUCESORES. MEXIC

Office: Apartado 37, Monterey, N. L., Mex. Mine office: Cerralvo, Nue León, Mex. Don Francisco Armendaiz, manager; Don José Armendaiz, assi ant manager. Property includes the Refugio and Barredon mines, carryi slightly argentiferous lead ores, which are properties of merit, and the Co rado mine, carrying ore up to 3% in copper tenor. Employs circa 60 men.

ARM EXPLORATION CO. CALIFORNI

Office: Kennett, Cal. Mine office: Raymond, Madera Co., Cal. Is said have a fair sized ore body, carrying high grade melaconite.

COMPAÑIA LA MINA ARMONIA. CHI

Mine office: Carrizal Alto, Freirina, Atacama, Chile. Property is old mine, opened to depth of 414 metres, which has been a considerable p ducer in the past, but output, according to last official returns available, now insignificant.

ARNOLD MINING CO. MICHIGA

Office: 64-50 State St., Boston, Mass. Mine office: Copper Falls, Kew naw Co., Mich. C. Howard Weston, president; John Brooks, secretary a treasurer; Wesley Clark, superintendent. Annual meeting, second Tuesd in May. Organized 1864, under laws of Michigan, with capitalization $2,500,0 shares $25 par; issued, $1,550,000. Lands, 3,323 acres, in T. 58 N., R. W., in two tracts, including the Old Copper Falls mine and the Arnold mi proper, with frontage of about 3 miles on Lake Superior. The Copper Fa mine, worked, circa 1850 until August, 1893, made 12,843 tons, 429 lbs. fi copper, mainly from the Owl Creek fissure, and paid dividends of $100,0 The Arnold mine proper, developed on the Arnold ashbed, was opened 18 reopened 1897, closed 1901, rock stamped averaging under 0.8% copper. H a stamp-mill and 2½ mile narrow-gauge railroad, known as Arnold & Ea Harbor, rolling stock of which has been sold. No. 1 shaft of the Arnold about 1,000′ deep, sunk at an angle of 26° with the horizon. Employs 4 m on exploratory work and found a considerable mass of native copper, Ju 1907.

ARRINO PROPRIETARY COPPER MINING CO. AUSTRALI

Office: 17 Queen St., Melbourne, Australia. David Blair, manager. Pr erty, in Western Australia, shows sandstone beds of Permian age, ore occ ring as bunches and thin veins following the joints and fissures of the sa stone. Ores are mainly oxides and carbonates, with a little sulphide ore posed recently. Sandstone formation, occupying a basin with gneiss walls, about 300′ wide by one mile long. Bulk parcels of ores shipped have giv returns of 3.75% to 25% copper. Property has rail connections, but the pr ess best adapted to treating ores of such unusual nature and occurrence h not been decided upon, at last accounts. Idle.

ARTOLA HERMANOS. CHIL

Dead. Sold their property at Cobija, Tocopilla, Antofagasta, Chile, to t Compañia de Minas i Fundiciones de Gatico.

ARZARD MINING CO. WASHINGTO

Mine office: Chewelah, Stevens Co., Wash. L. Bryant, manager. Lan 160 acres, patented, on Round Mountain, 5 miles south of Chewelah, open by an 80′ tunnel, said to show a 30′ vein of medium grade copper ore.

[illegible] ASBECK BRÜGGEN-UND BRÜGER-ROBERT. GERMANY.

Mine office: Hünsbl, Westfalen, Germany. Idle for several years.

ASHED MINING CO. MICHIGAN.

Office: 64-50 State St., Boston, Mass. Mine office: Copper Falls, Keweenaw Co., Mich. C. Howard Weston, president; John Brooks, secretary and treasurer; Wesley Clark, superintendent; preceding officers, T. F. Farmer and W. C. Fiske, directors. Organized, 1880, under laws of Michigan, with capitalization $1,000,000, shares $25 par. Annual meeting, second Tuesday in March. Lands, 1,143 acres, in vicinity of Copper Falls, adjoining the Arnold mine. Was known originally as the Petherick. Did some exploratory work 1905-1906; since idle. Very fully described Vol. II.

ASHEBORO COPPER MINING CO. NORTH CAROLINA.

Mine office: Asheboro, Randolph Co., N. C. H. D. Landers, president; J. M. Holliday, vice-president; W. C. Hammond, treasurer; M. W. Parrish, secretary; W. L. Thurber, manager. Organized under laws of North Dakota, with capitalization $100,000, shares $1 par. Lands 93 acres, on which a little mining was done in the Nineteenth Century. A carload of ore gave returns of $16.85 per ton, with 8.6% copper and small gold values. Also had an option on 600 acres of gold-bearing lands at last accounts.

ASHIO MINES. JAPAN.

Owned by Furukawa Mining Co.

ASHLAND MINING CO. COLORADO.

Mine office: Ohio, Gunnison Co., Colo. Carroll M. Carter, superintendent, at last accounts. Property is the Carter group, carrying gold, silver, lead, copper and zinc ores. Has steam power.

ASH PEAK MINING CO. ARIZONA.

Mine office: Duncan, Graham Co., Ariz. Arthur J. Murphy, Jr., manager. Has secured assays giving high values in copper, silver and gold. Has power equipment and ore-bins.

COMPAÑIA MINERA DE ASIENTOS. MEXICO.

Mine office: Asientos, Ocampo, Aguascalientes, Mex. Harry Rab, superintendent. Lands include the Nopensada and Alta Palmira mines, antiguas, and the Veta Grande and Refugio mines. The Nopensada, said to have been a considerable producer in early days, carries mainly slightly argentiferous copper ore. The Alta Palmira, having a 200′ shaft, produces mainly silver ore, with small copper values in the upper workings. The Refugio is said to show ore carrying up to 13% copper, with 1,100 grams silver per metric ton, and small gold values. Mines are not developed extensively. Equipment includes a steam and electric plant at the Nopensada and 2 electric hoists at the Alta Palmira. Property was leased to Asientos Copper Co., but latter said, June, 1908, to plan relinquishing the lease. Considerable ore was shipped, 1907.

ASIENTOS COPPER CO. MEXICO.

Mine office: Asientos, Ocampo, Aguascalientes, Mex. J. F. Foster, superintendent. Company is said to plan relinquishing the property, which is held under lease from the Compañia Minera de Asientos.

WALTER ASKEW. MEXICO.

Office and mine: Guachinago, Jalisco, Mexico. Property is known as the Oeste, showing a large vein giving good assay values in copper, silver and gold.

ASMUS BOYSEN MINING CO. WYOMING.

Office: 226 South Clark St., Chicago, Ills. Mine office: Thermopolis, Fremont Co., Wyo. Asmus Boysen, president; N. C. Brorson, secretary and

treasurer. Organized under laws of Wyoming, with capitalization $25,00 shares $100 par. Boysen claimed the right to locate 180,000 acres o Shoshone Indian reservation, in consideration of reliquishing a contract the Shoshone and Arapahoe Indians, but fell afoul of the United State ernment, and finally compromised on 640 acres. Company claims to own oil and coal lands. Several long tunnels have been driven, and a tram but whether ore has been found or not is known only to the manag Company is building a light and power plant.

SOCIÉTÉ CIVILE DES MINES DE CUIVRE D'ASPEICH. FRA

Office: 3, Rue de Milan, Paris, France. G. Caton, manager, at la counts. Lands are in the Basses Pyrenees, France. Idle for some time

ASTOR MINING CO. COLOR

Mine office: Eureka, San Juan Co., Colo. E. C. Condit, superinte Property includes the Surprise, Mogul and other claims, carrying ores o silver, lead and copper. Has steam, water and electric power.

ASTROLABE MINING SYNDICATE. NEW GU

Mine office: Port Moresby, British New Guinea. Lands, 150 acres Sapphire Creek, circa 16 miles from Port Moresby, main tract of 120 being a reward claim for discovery. The main tract has a 50′ shaft, s show a 6′ vein carrying cupriferous and arsenical pyrite, giving assays copper, with traces of gold and silver, but the surface ores, in alluviu mainly malachite, giving returns, 1906, from shipment of 17 tons, o to 32% copper, with traces of gold. Apparently this ore was secured detrital material, deposited by the Laloki river. A 30-acre tract lyin mile east of the main workings shows a gossan carrying green carbonate assaying 3 to 4% copper, and a short tunnel shows a little mal and cuprite. Was making, early 1908, bi-monthly shipments to Newcas 40 tons of ore, ranging 20 to 40% in copper tenor.

SOCIEDAD INDUSTRIAL ASTURIANA. S

Dead. Formerly at Torres, Teruel, Spain.

SOCIEDAD INDUSTRIAL DE ATACAMA. C

Office: Copiapó, Atacama, Chile. Works office: Tierra Amarilla, Co Atacama, Chile. Mine office: Almolanos, Copiapó, Atacama, Chile. Pri mine is the Lautaro, in the San Antonio district, carrying an abunda chalcopyrite of 5 to 7% copper tenor, with limestone gangue, in a po dyke. A modern concentrator was built, 1904, at Lautaro, and a large electric installation, to utilize the power of a nearby river and distribute for some distance, was under construction at last accounts. The Descub mine, at Puquios, also has been rehabilitated with a new plant, including and electric power.

The smelter, on the line of the Copiapó & Interior railway, does a business also, treating silver-lead ores as well as copper. The Tierra An plant includes 6 reverberatory furnaces turning out Chile bars, two calcining furnaces, 2 reverberatory furnaces for bars and two 54x54″ furnaces. The power plant includes four 110-h. p. boilers and 3 small e motors. Fuel is local coal and imported coke, latter used in charges of to 6 tons of ore. Product is auriferous and argentiferous Chile bars and ores treated, 1903, averaging 11.74 to 12.42% copper. Smelter employ men, at average wages of 2.25 pesos daily.

Company also owns a smelter at Caldera with a 120-ton rectangular furnace and converter. This has gas engines, run by producer gas, which a great economy over the old steam plant, works also having electric with independent motors for each department. Production of the com 1903, was 2,396,252 lbs. fine copper.

ATACAMA MINERAL CO., LTD. **CHILE.**

Dead. Voluntarily liquidated, July, 1902. Formerly at Taltal, Atacama, Chile.

ATBASAR COPPER FIELDS, LTD. **SIBERIA.**

Office: care Speyer & Sons, 65 London Wall, London, E. C., Eng. Organized Nov. 28, 1907, under laws of Great Britain, with capitalization £250,000, shares £1 par, to acquire copper properties in Siberia.

ATE MINE. **JAPAN.**

Mine office: Komatsu, Kaga, Japan. The mine has two main veins, in sparite and brecciated tuff, one being a fissure and one a contact vein. These veins cross, the intersection giving the richest ore, while at a little distance from the point of intersection the veins thin out and become of poor quality. Ore is mainly chalcopyrite, with iron pyrites, showing some bornite and tenorite, and averages about 10% copper in the upper portions. Production, 1900, was 231,484 lbs. fine copper, and in 1907 was only 194,305 lbs. fine copper.

ATHELSTAN GOLD MINING CO., LTD. **BRITISH COLUMBIA.**

Dead. Absorbed, 1907, by Dominion Copper Co., Ltd.

ATHELSTON & JACKPOT MINING CO. **BRITISH COLUMBIA.**

Dead. Absorbed, 1904, by Montreal & Boston Cons. Mining & Smelting Co.

ATLANTIC MINING CO. **MICHIGAN.**

Office: 15 William St., New York, N. Y. Mine office: Atlantic Mine, Houghton Co., Mich. Joseph E. Gay, president; John R. Stanton, secretary and treasurer; preceding officers, J. Wheeler Hardley, William A. Paine and Samuel L. Smith, directors; F. McM. Stanton, agent; Theodore Dengler, superintendent; F. G. Coggin, mill superintendent; John Stratton, mining captain; Hon. A. D. Edwards, clerk; John Grigg, master mechanic.

Organized December, 1872, under laws of Michigan, reincorporated, 1901, for term of 30 years, and capitalization increased, 1902, to $2,500,000, shares $25 par; $9.80 paid in. Annual meeting, second Tuesday in March. American Loan & Trust Co., Boston, transfer agent. Boston Safe Deposit & Trust Co., registrar. Has paid dividends of $990,000, last dividend being $50,000, in 1905.

The old Atlantic mine lies about 2 miles south of Portage Lake, and 4 miles southwest of Houghton, on a 640-acre tract, including the mines known before 1872 as the South Pewabic and Adams. The Atlantic lands, all on the mineral belt, are the South ½ of Section 4, except the Southeast ¼ of the Southeast ¼; North ½ of Section 9; Northwest ¼ of Section 10, and Section 16, all in town 54 North, Range 34 West; also several thousand acres of timber lands, a millsite on Lake Superior and valuable frontage on Portage Lake. The old mine, fully described in Vol. V., was opened on an amygdaloidal bed of about 15' width, the lode being the most westerly worked in Houghton county, and known locally as an ashbed. This bed returned an average of about 14 lbs. fine copper per ton. There are 6 shafts, lettered in order from north to south as A to F. C shaft was abandoned after the fire of 1908; E shaft was used for a manway only and F shaft was put out of commission in 1902. Beginning 1904, serious trouble was experienced from caving ground and air-blasts, the latter being merely artificial earthquakes caused by subsidence of the hanging wall. The old stopes average about 15' width for nearly a mile in length and for nearly a half mile in depth. Air-blasts continued with increased severity, finally ruining the shafts and putting the mine out of commission May, 1906. Efforts were made previously to work on a modification of the caving system, but were too late, and the mine was lost. It may be reopened at some future time, by sinking new incline shafts on the footwall. Probably 2 new shafts of large capacity would be sufficient to operate the entire mine, which is estimated to contain about 6,000,000 tons of stamp-

rock, which, though low in grade, should be worked at a fair pr
Atlantic was noted, for two decades, as the lowest grade profita
the world, the management performing wonders in the way of eco
traction of values that, under ordinary circumstances, would have
lessly unpayable.

At the old mine there is an unusually well-built mining tow
population, having about 500 buildings, half owned by the com
several churches and one of the best graded schools in the sta
equipment included a number of shops, engine-houses and shafth
powerful and effective hoists, air-compressors and general mining

The lands of the old Atlantic mine should carry the souther
of the Pewabic lode, worked by the Quincy Mining Co., though thi
been located. Sections 4, 9 and 10 were tested, 1907, by trenchi
mond-drill bores, and a shallow shaft was sunk on the so-called
which parallels the Atlantic ashbed about one-half mile to the ea
nothing of especial promise was developed.

The future of the Atlantic apparently lies in the new mine
opened on Section 16, between the rich Baltic mine and the highl
Superior mine. An exchange of 39 acres, made 1905, between t
and Baltic corporations, corrected lines for both, and obviated pc
northernmost shaft of the Baltic and the southernmost shaft of t
while the Atlantic also secured the hinterland of the Baltic lod
for engine-houses, shafthouses, power plants and general shops, and
Atlantic sufficient outcrop of the Baltic bed to sink 2 shafts. Explor
1897-1903, failed to locate the extension of the Baltic lode, owing t
flexure, accompanied by faulting. The Section 16 mine is opened o
by a single 3-compartment shaft having 2 skipways, though a sec
planned, tentatively. The Baltic bed, as developed on Section
and strong, but disturbed to great depth, the first ground to carry
values having been opened on the 12th level. The mine was op
16th level, September, 1908, the bottom showing more regular g
considerable good stamprock. In crosscutting west from the sl
13th level, an unidentified lode carrying a little copper was disc
1908. Equipment at Section 16 includes 4 boilers and 3 air-comp
of 15 drills capacity. The old mine has ample machinery to equip
the Baltic lode with an efficient plant, while leaving sufficient m
operate 2 new shafts at the old mine, if reopened.

The Atlantic railroad, owned by the company, connects mi
with 9 miles of main line, and a 3-mile branch line runs from the
old millsite on Portage Lake, where there are coal and merchand
for receipt of fuel and supplies. The railroad has 4 Baldwin ar
locomotives, 130 hopper cars for rock and coal, and 60 flat cars fo
general freight. The mine, also, is on the main line of the Co
railroad.

The stampmill, built 1895, at Redridge, Lake Superior, on a
nearly 2 miles of water frontage, is 151x234', of wood, on stone
Water is furnished from a dam, described in the article on Balti
has 6 stamps with 18" cylinders, of about 400 tons daily capacity e
regrinding mills are used for raggings, and round tables have be
by Overstroms. Power is supplied by a 14x42" Reynolds-engine of
tern. There are 7x14x12" Gardner fire pumps in the mill and boil
joining. A machine shop in the mill is supplied with all tools requ
pair work and fitting. Adjoining the mill is the 71x101' boiler-hou
on stone foundations. A Green fuel economizer saves about 12% i

There also are a number of comfortable dwellings for workmen, a 30x36' frame warehouse, store building and smithy. The mill treats the rock of the Michigan mine.

Trouble at the old mine, which begun in 1904, was reflected by decreased production, output being 5,505,598 lbs. fine copper in 1903; 4,049,731 lbs. fine copper in 1905, and only 1,539,082 lbs. fine copper in 1906, with no production in 1907.

The Atlantic enjoys the inestimable advantage of a management that is highly experienced, economical and efficient, and while the developments at the new mine on Section 16 are not yet sufficient to warrant an absolute prediction of success, the results secured, though slow in coming, are decidedly promising.

ATLAS COPPER MINING CO., LTD. **IDAHO.**

Office: care of Lyman Wood, Wallace, Idaho. Property is in Shoshone county, Idaho.

ATLAS COPPER SYNDICATE, LTD.

Dead. Compulsorily wound up, July, 1901. Was an English corporation.

ATLAS CORPORATION. **CALIFORNIA & WASHINGTON.**

Mine office: Granite Falls, Snohomish Co., Wash. Jos. Weissbein, president; Karl A. A. Stahlgren, vice-president; H. S. McCartney, secretary and treasurer. Property includes the Gold Flat gold mine, at Nevada City, Cal., and the Wayside mine, near Granite Falls, latter showing sulphide copper ore. Company in hands of receiver June, 1908, and former office at 71 Broadway, New York, closed.

ATLAS EXPLORATION & MINING CO. **ARIZONA & MEXICO.**

Office: Douglas, Ariz. R. O. Johnson, president; N. W. Chase, treasurer; D. T. Dunlap, secretary; James Ray, superintendent. Organized June 14, 1901, under laws of Arizona, with capitalization $5,000,000, shares $1 par. Annual meeting, first Tuesday in January. Has undeveloped mineral lands, known as the Atlas group, in the Warren district of Cochise county, Arizona, and a fair prospect about 15 miles south of Douglas, in the northern part of the Arizpe district of Sonora, Mexico, latter showing auriferous copper ore. Idle for several years.

ATTUNGA MINE. **AUSTRALIA.**

Mine office: Attunga, N. S. W., Australia. W. H. Edwards, superintendent. Property, in the Tamworth division of the Peel and Uralla mining district, has a main shaft of 280'. Was developing, in search of sulphides, expected with greater depth, at last accounts.

AKTIEBOLAGET ATVIDABERGS KOPPARVERK. **SWEDEN.**

Office: Atvidaberg, Sweden. Mine and works office: Bersbo, Ostergothland, Sweden. Baron Th. Adelsward, president and general manager; Axel Tygren, superintendent; C. A. Rudelius, smelter superintendent. Organized 1900, under laws of Sweden, with capitalization 900,000 kroner, shares 1,000 kroner par, fully paid. Ore is slightly argentiferous chalcopyrite, averaging 2% copper. Mine has 8 shafts, of 300' to 1,400' depth, with about 4,000' of workings. Water power generates electricity that operates the mines and works. Has a smelter, at Bersbo, 9 kilometers from mine, with rail connection, with 3 roasting furnaces, 3 reverbeatory furnaces, and settling tanks for concentration, which was partly burned, 1905. Has been developing, without production, since 1902, when output was 163,270 lbs. fine copper.

GEWERKSCHAFT AUGUSTE I. **GERMANY.**

Dead. Formerly at Herscheid bei Bärenstein, Westfalen, Germany.

KUPFERERZBERGWERK AURORA. **GERMANY.**

Mine office: Huckelheim, Bavaria, Germany. Idle.

AURORA CONSOLIDATED MINING CO.

Mine office: Mulegé, Sur, Baja California, Mex. G. W. Russell, Property includes the Aurora and Princesa mines, carrying auriferou ores. Has steam power, 5-ton mill and 50-ton smelter, employing men, at last accounts.

AURORA MINES CO. NEW

Office: care of Robt. F. Fitz, Elgin, Ills. Mine office: Lordsbu Co., N. M. D. H. Kedzie, local agent. Organized under laws of Company fell into debt and closed down, but obligations were pa sumably idle.

AURORA MINING CO.

Dead. Formerly at La Cananea, Arizpe, Sonora, Mex.

AUSTRALIAN COPPER SYNDICATE, LTD. AUS

Dead. Voluntarily wound up, February, 1903. Was an English tion.

AUSTRALIAN MINING CO., LTD. AUS

Office: 63 Queen Victoria St., London, E. C., Eng. Colonial offic side, Adelaide, South Australia. Mine office: Reedy Creek, Robe C Australia. Walter J. C. Cutbill, chairman; Sir Samuel Davenport, K. colonial agent; Edgar Collier, secretary. Organized Feb. 22, 1902, u of Great Britain, with capitalization £40,000, shares £2 par, as recor of a company of same name, chartered 1865. Paid a 2s. dividend S 1905. Lands, circa 20,000 acres, formerly included the Tungkillo m 1906, to Port Lincoln Copper Co., Ltd.

AVALANCHE COPPER MINING CO. MO

Office: care of J. W. Beckett, secretary, Spokane, Wash. Mi Cañon Ferry, Broadwater Co., Mont. W. H. Hill, president and gen ager; A. M. Baldwin, vice-president; C. E. Russell, superintenden Vanderford, engineer. Lands, 10 claims, area 200 acres, circa 25 mi east of Helena, having several shallow shafts and short tunnels, sh ore body assaying up to 20% copper, and a 300′ crosscut tunnel, latte a 20′ vein carrying a 3′ paystreak of smelting ore said to carry hig values, 1 oz. silver and $12.40 gold per ton. Is said to plan a concen small smelter.

MINA AVENTURERA.

Mine office: Sabinal, Chihuahua, Mex. D. C. Sutton, general Ore bodies occur irregularly in slate dikes, and carry silver, lead an Mine is opened by shafts, and equipped with steam power. Employs men.

AVINO MINES OF MEXICO, LTD.

Office: 138 Salisbury House, London, E. C., Eng. Mine office Gabriel, San Juan del Rio, Durango, Mex. James B. Palmer, chairma Nichols, resident manager and consulting engineer; F. F. Fuller, Organized Feb. 24, 1905, under laws of Great Britain, with capi £1,000,000, shares £1 par; issued, £978,429. Debentures, £18,000. Ope June 30, 1906, showed net expenditures of £6,899 above receipts. L acres and a 302-acre damsite, 10 miles from a railroad. Mine has an and 600′ tunnel, with several large pits, one being nearly 400′ in wid considerably greater length. Property is said to show about 2,000,0 tons of low grade silicious argentiferous copper ore, average value of duced, July and August, 1907, being reported at 36s. per ton. Mine is c have produced about $60,000,000 in the past, mainly in silver, but pr this should be 60,000,000 pesos, equal to about $30,000,000. Property a little smelting ore, but is mainly of concentrating grade.

Property has steam, gas and electric power, with a 300-h. p. electric plant operated by a Crocker-Wheeler gas engine. A large concentrator was found unsuitable and was replaced by a hyposulphite lixiviation plant, which was claimed to save 85% of the silver and 30% of the gold values. Property has been poorly handled, former management spending too much money on surface and not enough in the mine, in addition to making a serious mistake in the plan of ore treatment. The mine has an immense amount of ore of dangerously low average tenor, but there have been too many changes in local management and processes, by reason of which no management or process has been given a fair test. Company is in such a financial position that either reconstruction or liquidation seems imperative.

AWAYA-IKEDA CO., LTD. **BRITISH COLUMBIA.**

Office: 46 Davis Chambers, Vancouver, B. C. Mine office: Ikeda Bay, Moresby Island, Queen Charlotte group, B. C. Employs 92 men. Shinazo Awaya, president; Arichika Ikeda, vice-president and general manager; K. Kikano, secretary and treasurer; Joseph Marco, mine superintendent; S. Kuroda, engineer. Organized 1907, under laws of British Columbia, with capitalization $100,000, shares $100 par.

Lands, 42 claims, area 2,100 acres, on Ikeda Bay, at the southern end of Moresby Island, in several groups, including the Lilly group of 8 claims, area 400 acres, on the southwest side of Ikeda Bay, which shows numerous ore bodies in contact deposits between diorite and limestone, of which one, under development, is of 5′ average width, proven for 1,000′ in length and about 300′ in depth. The 20′ ore-chute carries lenses of ore with gangue of siliceous country rock, and occasional stringers of quartz and limestone. Development is by tunnels of 110′, 220′, 170′, and 330′, the upper tunnel carrying about 11′ of low grade ore and the lower tunnel having about 5′ of high grade chalcopyrite, ranging 8 to 12% in average copper tenor, 3 to 5 oz. silver and about $5 gold per ton.

The mine, about 6,000′ from tidewater, is connected by a 36″ gauge horse-tram with a 150′ wharf having a 110′ ell. The inlet is charted and admits steamers of fair size at flood tide, shipments being made from ore-bunkers on the wharf. The company's office, hospital and sleeping quarters were in an old stern-wheel steamer, beached for the purpose, but this has been succeeded by 12 buildings, including 2 shops, hospital, store, boarding-house, superintendent's house, etc. Equipment includes an Ingersoll-Sergeant air-compressor. Fuel is wood. Production, 1907, was 500 tons of ore; in 1908 about 4,500 tons, and should be about 10,000 tons in 1909. Ore shipped, 1907, to Ladysmith smelter, gave average returns of about 9% copper, 3.5 oz. silver and $5 gold per ton, and production, 1907, is estimated at 125,000 lbs. fine copper. The company was organized for fishing purposes, but, on the discovery of copper, interested the Furukawa Mining Co., of Japan, which is said to have set aside a capital of 500,000 yen for development purposes. The property is exceptionally promising and has an excellent management.

AXIS COPPER MINING CO. **WYOMING.**

Mine office: Rambler, Carbon Co., Wyo. Lands lie between the Doane mine and holdings of the Dill Gold & Copper Mining Co.

NICOLÁS AZALIA. **PERÚ.**

Office and mine: Morococha Junín, Perú. Lands, 2 pertenencias, including the Alicia mine, yielding ore averaging about 10% copper. Production, 1904, was 115,609 lbs. fine copper.

COMPAÑIA MINERA LA AZTECA y ANEXAS. **MEXICO.**

Letter returned unclaimed from former mine office, Ensenada, Norte, Baja California, Mex. Property has silver-copper ores.

AZTEC-ALGOMAH DEVELOPMENT CO. MICHIG

Dead. Formerly at Greenland, Ontonagon Co., Mich. Described Vol.

AZTEC COPPER CO. ARIZO

Letter returned unclaimed from former office, 136 Hartford Bldg., Chic Ills. Mine office: Prescott, Yavapai Co., Ariz. E. M. Sanford, attor Lands, 20 claims, showing copper ores. Idle.

AZTEC COPPER CO. MICHIG

Office: care of John C. Watson, president, 68 Devonshire St., Boston, M Mine office: Greenland, Ontonagon Co., Mich. F. W. Morandi, secretary treasurer. Organized August, 1863, under laws of Michigan, and reorgan 1880, under laws of Michigan, with capitalization $1,000,000, shares $25 Lands, 320 acres, being W. ½ of Section 31, T. 51 N., R. 37 W., also 1,214 a of agricultural and timber lands in Sections 10, 12 and 14, T. 50 N., R. 3 Work was begun 1862, and property had a stampmill in early days, produ 353 tons, 863 lbs. fine copper, of which 100 tons were secured in a single m Exploratory work was done, 1905-1906, on the Knowlton lode, by the A Algomah Development Co. Property should carry the amygdaloid bed being opened by the Lake Copper Co. Idle.

AZTEC COPPER MINING & SMELTING CO. MEX

Dead. Succeeded by Aztec Copper Smelting Co. Formerly at Guachina Mascota, Jalisco, Mex.

AZTEC COPPER SMELTING CO. MEX

Office: 1309 Stephen Girard Bldg., Philadelphia, Pa. Mexican gen office: Alcalde, 29¼, Guadalajara, Mex. Mine office: Guachinango, Mas Jalisco, Mex. Dr. Pemberton Dudley, president; J. W. Tyrell, vice-presid Geo. J. Graham, manager; preceding officers, Perry H. Dudley, G. H. D. Mar F. B. Graham, Wm. A. Young and E. J. Fithian, directors; J. F. Grah secretary. Organized June, 1901, under laws of New Jersey, as successor the Aztec Copper Mining & Smelting Co., with capitalization $300,000, sh $1 par. Lands claimed are circa 10,000 acres, of which 8,000 acres are to be well timbered with oak and pine, and to be well watered, with an av able water power on the Rio Ameca. Lands include 2 mines, known as Concha and La Perla, opened by shafts and tunnels, and claimed by comp to show ore averaging about $30 per ton in values. Has an 80-ton conc trator with 2 Elspass mills and 6 tables. Present officers apparently are responsible for the atrocious lies of a former management, which promi speedy dividends, which of course have not materialized.

AZTEC GOLD & COPPER MINING CO. COLORA

Office: 18 Tremont St., Boston, Mass. Mine office: Needleton, La Pl Co., Colo. David W. Williams, president; Chas. A. Howland, vice-preside Geo. F. Bradstreet, secretary and treasurer; Josiah Moore, general manag W. C. Kinney, engineer. Organized Nov. 10, 1899, under laws of Maine, w capitalization $2,000,000, shares $1 par; issued, $1,619,260. Lands, 19 clai in 5 groups, lying in the Needle Mountains, circa 16 miles south of Silvert showing 2 fissure veins in granite and porphyry, these averaging about width, one, opened by a 1,500′ tunnel, showing argentiferous galena above copper sulphides below, ores giving assays of $30 to $65 per ton. Equipm includes a 25-h. p. electric motor and 25-h. p. gasoline engine, with a 3,000-h waterfall available for development. Has 7 buildings, and plans extend main tunnel and constructing an aerial tram to the concentrator.

AZURE MINING CO. NEW MEXI

Office: 170 Broadway, New York, N. Y. Mine office: Leopold, Grant N. M. Louis Kahn, president; M. D. Rothschild, secretary and treasurer; Kahn, manager; Wm. R. Wade, superintendent. Lands, near the Burro Ch group of the Chemung, have a 415′ shaft, showing a little ore on the 2

level, and the Emerald claim shows oxide ore in a 140′ diamond drill hole, bored 1907. Lands show gossans carrying no copper, but with copper values at depth below, as proven by churn and diamond drill borings. Mine formerly was a considerable producer of turquoise, and is said to have been the largest turquoise mine in the United States, but such production has practically ceased, and present developments are for copper. The turquoise mine has an open cut and two tunnels. Holes bored, 1905, by churn drills, are said to have shown sulphide ores of 2.5% average copper tenor.

AZURITE COPPER CO. **ARIZONA.**

Dead. Formerly at Williams, Coconino Co., Ariz. Described Vol. VI.

AZURITE COPPER & GOLD CO. **ARIZONA.**

Dead. Lands sold to Mineral Hill Consolidated Copper Co. Formerly at Tucson, Pima Co., Ariz.

AZURITE COPPER MINING CO. **ARIZONA.**

Letter returned unclaimed from former office and mine, Globe, Gila Co., Ariz. Organized 1907, under laws of Arizona, with capitalization $1,000,000, shares $1 par, by Carl Eder, H. Sidow, Jacob Suter, C. W. Clement and C. W. Parsons.

AZURITE MINING CO. **WYOMING.**

Office: 365 Tenth St., Oshkosh, Wis. Mine office: Dillon, Carbon Co., Wyo. Henry L. Larsen, president; Arthur Bishop, vice-president; H. O. Granberg, secretary, treasurer and general manager; E. N. Sanders, superintendent; Frank Earle, consulting engineer. Organized Dec. 17, 1904, under laws of Wyoming, with capitalization $1,000,000, shares $1 par; issued, $635,000. Lands, 5 claims, area 100 acres, in the Battle Lake district, showing 3 fissure veins in gabbro, of 15′ to 20′ estimated width, opened by a 65′ shaft and 70′ tunnel, showing ore giving assays of 18% copper.

BABY McKEE GOLD MINING CO. **OREGON.**

Mine office: Sumter, Baker Co., Ore. Ores carry gold, silver, lead and copper. Has steam power. Presumably idle.

BACHELOR GOLD MINING CO. **COLORADO.**

Mine office: Lake City, Hinsdale Co., Colo. C. F. Meek, superintendent, at last accounts. Ores carry gold, silver, lead and copper. Has water power.

BACKUS & JOHNSTON. **PERÚ.**

Office: 74 Calle San Pedro, Lima, Peru. Works office: Casapalca, Oroya, Junín, Perú. The Natividad mine, employing circa 200 men, in 1907 produced 1,507 metric tons of ore averaging 14% copper and 14 to 70 oz. silver per ton. The smelter, known as the Fundición Casapalca, is a small but well-equipped matting furnace, on the Oroya railroad, 88 miles from Lima, at an altitude of 14,000′, having two 75-ton water-jacket blast-furnaces. Water power is used, and ores under 12% in tenor are not treated. Fuel is mainly German and English coke, costing 25 pesos delivered, though Peruvian coke is used at times, when necessity. Product is exported as a matte of 50 to 55% average copper tenor. Wages are 50 cents to $2 per 12-hour shift. Production, 1907, is estimated at 750,000 lbs. fine copper.

BADAJOZ COPPER MINES, LTD. **SPAIN.**

Office: 14 Bishopsgate St. Without, London, E. C., Eng. Mine office: Fuenlada, Badajoz, Spain. Lord Armstrong, chairman; J. W. Chalkley, secretary. Organized July 25, 1906, under laws of Great Britain, with capitalization £20,000, shares £1 par; issued, 3,000 shares, 1s. called up. Lands, 320 hectares, including the Suerte and Extramena copper mines. Presumably idle.

BADEN-BADEN GOLD MINING CO. **COLORADO.**

Dead. Formerly at Black Hawk, Gilpin Co., Colo.

BADGER COPPER CO. WYOMI

Letter returned unclaimed from former office, Laramie, Wyo. Org ized, 1902, to operate in Albany county, Wyoming, and in 1906 was drivin tunnel.

BADGER COPPER MINING CO. WISCONS

Office: care of B. J. Van Vleck, president, West Superior, Wis. Organ circa 1898, with capitalization $2,500,000, shares $1 par. Lands, 210 acres Section 8, Town 27, Range 12, Douglas county, Wisconsin, lying next west the North Wisconsin mine. Idle since circa 1900.

BADGER-HALL MINING CO. ARIZO

Office: Douglas, Ariz. Mine office: Paradise, Cochise Co., Ariz. Organ 1907, under laws of Arizona, with capitalization $1,000,000, shares $2 par. controlled, through ownership of entire stock issue, by Bisbee-Sonora Deve ment Co. Lands, 30 claims, area 545 acres, said to show an ore body 62′ v at surface and 50′ wide at depth of 200′, opened by tunnel. Is said to pl smelter, but should develop a mine first.

BADGER MOUNTAIN MINING & MILLING CO. COLORA

Dead. Was organized under laws of Wyoming, with capitaliza $150,000, shares 10 cents par. Lands were 6 claims. Formerly at Floris Teller Co., Colo.

BADGER STATE MINING & MILLING CO. WYOMI

Office and mine: Saratoga, Carbon Co., Wyo. Gustav Jensen, presi and manager; John H. Davis, vice-president and superintendent; C. E. Jen treasurer; A. H. McDougal, secretary. Organized Dec. 26, 1901, u laws of Wyoming, with capitalization $1,000,000, shares $1 par. Land claims, area 140 acres, on Jack Creek, showing 3 fissure veins, averagin width, claimed to give average assays of 50% copper, 50% lead and fro trace up to 400 oz. silver per ton, opened by shafts of 60′ and 105′, and by tunnel. Presumably idle.

BAGDAD GOLD & COPPER CO. CALIFOR

Office: care of Gordon & Co., 254 Wilcox Bldg., Los Angeles, Cal. office: Bagdad, San Bernardino Co., Cal. Sherman Washburn, president; Carrol, secretary. Is a prospect only, with about 250 feet of openings. for several years.

BAHIA EXPLORATION CO. BRA

Mine office: Jaguarary, Pará, Brazil. Lands, sundry claims about 50 m west of Jaguarary, giving ore assaying 2 to 4% copper.

BAILEY'S COPPER, LTD. TRANSVA

Office: P. O. Box 3170, Johannesburg, Transvaal. Mine office: Barbe Middelburg, Transvaal. A. Y. Niven, chairman; L. K. Jacobs, secre Organized circa May, 1907, under laws of Transvaal, with capitaliz £15,000, shares £1 par. Lands, 96 base metal claims, in the De Kaap Va near the Barberton Copper Syndicate, on which work was begun circa 1907. Property has a 5′ vein, traceable a quarter mile, opened by 2 sh A shaft being 85′ deep.

BAKER CONSOLIDATED COPPER MINING CO.

Office: 4 Campau Bldg., Detroit, Mich. John Baker, general mana Organized under laws of District of Columbia, with capitalization $2,500, Location of property, if any, unknown. Is regarded with suspicion.

BAKER MILLING, SMELTING & REFINING CO.

Office: 4 Campau Bldg., Detroit, Mich. John Baker, president; John Rolland, secretary and treasurer. Organized under laws of Oklahoma, w capitalization $10,000,000. President claimed to be putting a plant in Detro to be in operation during 1906, but no such plant materialized. Is regard with suspicion.

BALADE MINE. **NEW CALEDONIA.**

Mine office: Ouegoa, Diahot, New Caledonia. Mine, opened to depth of 150 metres, produced ore which was concentrated to average tenor of 17 to 20% copper, and exported to Australia for smelting. Idle since circa 1885.

BALAKLALA CONSOLIDATED COPPER CO. **CALIFORNIA.**

Office: 60 State St., Boston, Mass. Mine office: Kennett, Shasta Co., Cal. Works office: Coram, Shasta Co., Cal. W. H. Brevoort, president; Thos. A. Barbour, vice-president; Roy N. Bishop, secretary and mine manager; T. M. T. Raborg, treasurer; Duncan McVichie, manager director; Robeson T. White, smelter manager. Organized under laws of Nevada, with capitalization $[illegible],000,000, shares $25 par. Bonds, $750,000, at 6%, balance of bond issue of 4 series, being "C" series, $375,000, maturing July 1, 1909, and "D" series, $375,000, maturing July 1, 1910. Present company was a reorganization of the Balaklala Mining Co., control of which was sold simultaneously to two parties, requiring reconstruction to untangle matters. Windsor Trust Co., New York, and Federal Trust Co., Boston, transfer agents. Trust Company of America, New York, and First National Bank, Boston, registrars. Entire stock issue was owned by the Balaklala Copper Co., which has been reorganized as the First National Copper Co. An issue of $2,000,000 of convertible collateral bonds, at 10%, was authorized, but the public wisely was suspicious of bonds bearing such high interest, and issue was not floated, vote authorizing these bonds being rescinded at annual meeting, January, 1908.

Lands, variously reported as 64 claims, 72 claims and 80 claims, patented, [illegible] circa 1,200 acres, also about 300 acres of mill and smelter sites, and miscellaneous lands giving total holdings of 1,600 acres, well timbered, in the Flat Creek district, adjoining the Trinity. Company platted the townsite of Coram, and sold every lot therein. Lands, December, 1906, were 72 claims, [illegible] 1,149 acres, carrying 3,040′ of the strike of an ore body developed for [illegible],000′, showing an ore lense of 20′ to 60′ width and about 900′ length. In [illegible] the Sheridan group of 40 acres was bought for $20,000, and the Stowell group of claims has been added. Company reports 12 ore bodies, of which 3 are under development, these being reported as having average dimensions of [illegible]′ width, which obviously is an error, one ore body being 900′ long and one being 1,100′ long. The company reports that ore averages about 3% copper, 1 oz. silver and 0.03 oz. gold per ton.

Mine development is by tunnels, with upraises, providing for open-cast mining, which should give very cheap extraction. There are about 20 tunnels, the Weil tunnel being about 600′ in length. Surface above the main lense has been stripped, preparatory to open-cast operations. Development shows 3 distinct lenses, all more or less displaced by a series of step-faults from south to north. Ore is pyritic and must be smelted direct, without concentration. It has been claimed that average assays of the ore show 2.7% copper, and at an earlier date it was claimed, in the press, that one ore body averaged 11%, but in actual practice it is probable that extraction will not exceed 2.25%, or 45 lbs. per ton, and possibly may not be more than 2%, or 40 lbs. fine copper per ton. Assays show 75 cents to $1 per short ton in combined gold and silver values. The main ore body, according to the company's figures of December, [illegible], carried 2.462% copper, or 49¼ lbs. per ton, 0.846 oz. silver, equal to about 17 cents, and 0.025 oz. gold, equal to 50 cents. The report of Duncan McVichie, July 1907, gave 540,142 tons of ore in sight, with 342,307 tons reasonably safe to infer. Company's direct report of Aug. 11, 1908, claims 2,000,000 tons of ore in sight, with 1,000,000 tons blocked out for stoping, which figures seem unduly high, though there is no question that there are large ore bodies proven and blocked out.

The machinery plant of the mine includes installations of about 1,000 h. p.,

including a number of hoists, 5 compound air-compressors, and about 40 drills. There also are a sawmill, store, school, hospital and about 75 dwell Company has a 5-mile private railroad of 4′ 8″ and 36″ gauges, with 5 loc tives. The mine and smelter are connected by a Bleichert aerial tra 16,130′ length, having 62 wooden towers, highest 85′. The smelter, being l than the mine, tram is operated automatically, by gravity, having an estim hourly capacity of 75 tons.

The smelter, begun May, 1906, and practically completed, except conv plant, July, 1908, at a cost of approximately $2,000,000, is near the mout Cottonwood Creek, which flows into the Sacramento river at a point 4 south of Kennett and 13 miles north of Redding. The smelter building steel frame with roof and siding of galvanized iron, no wood being used. T may be trouble with the roof on account of sulphur fumes, but the smelt well designed, though lacking a converter plant, which obviously will be n sary later. The smelter nominally is of 1,200 tons daily capacity, having 400-ton blast-furnaces and an 18x96′ reverberatory furnace. Dust chamb 120x180′, being much wider than ordinary. The stack is 250′ high, of 18′ i diameter. The smelter has bunkers for 750 tons of ore, and steam is furni by two 250-h. p. Stirling boilers, fired with petroleum, in addition to the bo fired by waste gases from the reverberatory furnace. Electric power wi used exclusively, except for running 3 blowers for the blast-furnaces. Inst tion includes various motors of 5 to 150-h. p. each. The smelting plant incl a machine-shop, smithy, carpenter-shop, bunk-house and 24 dwellings workmen.

The American Smelters Securities Co. had a contract for treating ores of the Trinity Copper Co., which was turned over to the Balaklala. has been stated that this contract allowed an estimated profit of $2 per to treatment of Trinity ores, but this estimate is excessive. The Balaklala had a contract with the American Smelters Securities Co. providing for treatment of matte, but the latter company does not seem to be in a pos to carry out this contract advantageously.

There have been many wild assertions made regarding the prospe profits of the Balaklala. Interested parties have put forth estimate 15,000,000 lbs. fine copper production yearly, at a cost of 9 cents per po and estimates as low as 8 to 8½ cents per pound have been made. unlikely that the ore in considerable quantities will average better than 2 copper, and may be less. Figured on a fair basis, costs should be abou cents to $1 per ton for mining, 25 cents for transportation, $2.50 to $3.5 smelting, and 50 cents to $1 for incidentals, giving totals of $4.50 to $5.7 ton for a product brought to matte. Allowing 45 lbs. fine copper per recovery, the cost would be 10 cents per pound for fine copper in the for matte, if average costs were as low as $4.50 per ton of ore, or 12¾ cents pound if ore costs were $5.75. An estimate of 10 cents per pound for co brought to matte would seem to be as low as can be made with safety. The of conversion, if done at the Balaklala smelter, as it should be, would be a 1½ cents per pound, in all likelihood, and freight and refining would cost a 2 cents per pound additional, a total of 3½ cents added to previous giving a minimum cost of 13½ cents per pound, or a maximum cost of cents per pound, from which should be deducted about 2 cents per pound included gold and silver values saved by electrolytic refining, this offse costs of freight and refining. Allowing for deduction of gold and silver v from gross cost, the Balaklala copper should cost a minimum of 11½ cent a maximum of 14¼ cents per pound, when placed on the market. The some possibility that the minimum figure may be slightly reduced, also a p bility that the maximum may be exceeded slightly, but the figures given

be accepted as conservative estimates, although they differ very much from those of 8 or 9 cents, given out by interested parties.

The work at the mine and smelter has been good, with the exception of the omission of a converter plant, but the company has been poorly financed, and apparently was injured by its affiliations both with the Guggenheim and Lawson interests. The Guggenheims were said to own 30,000 shares. The plan of an operating company and holding company is one that seems in high favor with many financiers, but about the only excuse for such a bifurcated corporation is that somebody is to be kept in the dark, this somebody usually being the innocent investor. The excuses of delayed shipments, etc., given out for non-completion of the smelter, seem to have been a euphemistic method of accounting for delays due to shortage of cash.

The company being practically bankrupt at the close of 1907, and 10% fumes being absolutely unsalable, reorganization was necessary, and the holding company, known as the Balaklala Copper Co., has been reorganized under the name of the First National Copper Co., as set forth in the description of the latter-named corporation. While the Balaklala Consolidated Copper Co. has been poorly financed, and many exaggerations have been made public regarding the richness of the mine, and its possible earnings, the property is valuable beyond doubt, and with sufficient capital, and under good management, the mine, though low in grade, should be operated at a profit.

BALAKLALA COPPER CO. **CALIFORNIA.**

Office: 60 State St., Boston, Mass. Mine office: Coram, Shasta Co., Cal. Clarence K. McCornick, president; N. Adams Egbert, vice-president and secretary; T. M. T. Raborg, treasurer; preceding officers, Edgar L. Newhouse and Wm. A. Baird, directors. Organized Feb. 24, 1906, under the laws of Maine, with capitalization $10,000,000, shares $25 par; capitalization reduced, March, 1907, to $4,000,000, and increased immediately thereafter to $6,000,000, shares $10 par. The only property of the company is the entire stock issue of the Balaklala Consolidated Copper Co. Company, becoming bankrupt at the end of 1907, has been practically reorganized through the formation of the First National Copper Co., which, March, 1908, loaned $450,000 to the Balaklala Copper Co., taking as security therefor the entire stock issue of the Balaklala Consolidated. About 98% of the shareholders of the Balaklala Copper Co. have deposited their stock for new stock of the First National. This leaves the Balaklala Copper Co. a mere shell, and, to all practical intents and purposes, is out of business.

BALAKLALA MINING CO. **CALIFORNIA.**

Dead. Succeeded, circa 1904, by Balaklala Consolidated Copper Co. Formerly at Coram, Shasta Co., Cal.

BALACLAVA COPPER MINING CO. **AUSTRALIA.**

Mine office: Broken Hill, N. S. W., Australia. W. O. H. Simons, superintendent, at last accounts. Has auriferous copper ores. Presumably idle.

BALBACH SMELTING & REFINING CO. **NEW JERSEY.**

Office and works: Newark, Essex Co., N. J. Edw. Balbach, Jr., general manager. Property is an electrolytic refinery, having in connection a small smelting plant. Refinery has 430 tanks, operated on the multiple system, with one 300-kw. generator and two 125-kw. generators. Capacity of plant is circa 2,750,000 pounds electrolytic copper monthly. The metallurgical practice of the works ranks deservedly high. Employs circa 250 men.

BALD MOUNTAIN MINING CO. **WASHINGTON.**

Mine office: Clear Lake, Skagit Co., Wash. A. H. Rogers, superintendent, at last accounts. In March, 1907, was said to have secured ore assaying 15 to 25% copper.

BALD MOUNTAIN MINING & SMELTING CO. MONTA

Mine office: Saltese, Missoula Co., Mont. E. W. Conrad, superinten
Was developing, with a small force, in 1907.

BALHANNAH COPPER & GOLD MINE, LTD. AUSTRA

Dead. Formerly at Onkaparinga, South Australia.

BALHANNAH MINE. AUSTRA

Mine office: Onkaparinga, South Australia. Property is an old
with 8 shafts, deepest 300′, 14 miles southeast of Adelaide. Ores in
copper, zinc, lead, silver and gold. Idle many years.

BALKAN COPPER CORPORATION, LTD. TURE

Office: 6 Great St. Helen's, London, E. C., Eng. Mine office: Yard
Turkey. Sir Owen R. Slack, chairman; Ernest A. Foster, secretary; M
Krieger, managing director in London. Organized Sept. 5, 1899, under
of Great Britain, with capitalization £250,000, shares £1 par; issued, £22
Lands include the Yardimli mine, area 7,900 acres, and the Chapzi-Hani
area nearly 2,500 acres, in the Rhodope Mountains, northwest of Const
nople, held on a 99-year lease by firman from the Turkish crown at a
royalty of £300. Property also includes a small undeveloped mine at
Khaneh, in the district of Xanthi, held under annual royalty of £100. Idl
some years.

BALLA BALLA COPPER MINES, LTD. AUSTRA

Dead. Reorganized, Apr. 16, 1901, as New Balla Balla Copper Mines.

BALLARAT COPPER MINING CO. WASHING

Mine office: Newport, Stevens Co., Wash. Ores carrying copper, gold
silver, have been opened by a crosscut tunnel. Idle for some years.

BALL COPPER CO. ARIZ

Office: 526 Security Bldg., Los Angeles, Cal. Mine office: Winke
Gila Co., Ariz. Chas. E. Finney, president; Paul Burkes, vice-presiden
J. Mitchell, secretary; N. A. Vyne, treasurer; preceding officers, W.
Drescher, Chas. P. Joslin and John M. Ross, directors; Edw. V. Brook
gineer. Organized Feb. 1, 1908, under laws of Arizona, with capitaliz
$3,000,000, shares $10 par. Has authorized a $50,000 bond issue, at 6%.
pany plans sinking a 3-compartment 800′ shaft, at a cost of about $150,0

BALTIC MINING CO. MICHI

Office: 82 Devonshire St., Boston, Mass. Mine office: Baltic, Hou
Co., Mich. Employs about 1,000 men. Wm. A. Paine, president; Fre
Stanwood, secretary and treasurer; preceding officers, Samuel L. Smith,
eron Currie, J. Henry Brooks and R. Townsend McKeever, directors; Fre
Denton, general manager; Clarence G. Mason, engineer; F. G. Coggin,
superintendent; John Jolly, superintendent; Wm. C. Cole, clerk; W. J. Rich
master mechanic.

Organized December, 1897, under laws of Michigan, with capitaliz
$2,500,000, shares $25 par; $18 paid in. American Trust Co., Boston, tra
agent. Old Colony Trust Co., Boston, registrar. Annual meeting, first
day in March. Owns $80,000 stock of Michigan Smelting Co. Practicall
tire stock issue is owned by Copper Range Consolidated Co. Dividends
been $1,250,000 in 1905; $1,400,000 in 1906, and $1,000,000 in 1907.

Assets, Jan. 1, 1908, were $1,261,862.41, with liabilities of $649,11
giving an excess of assets of $612,747.18. For 1907 the mining profit
$1,477,650.25, with construction account of $265,782.48, leaving net earning
the year of $1,157,971.57, with a surplus of $454,775.61.

Lands, 800 acres, near the Eastern Sandstone of the Keweenawan co
belt, about 75 acres being on the sandstone and non-mineralized. Holdi
comprise all of Section 21 except the southeast quarter, and the west hal
Section 20, Town 54 North, Range 34 West. Lands are bounded on the n

by the Wheal Kate and Section Sixteen of the Atlantic; on the east by St. Mary's Mineral Land Co.; on the south by St. Mary's lands, lands of Hussey, Howe & Co. and the Trimountain mine; on the west by the Trimountain. In 1905 exchanged 39 acres with the Atlantic mine, which will enable the Baltic to sink No. 5 shaft to much greater depth than otherwise possible. To the southward the Trimountain and Champion mines are opened on the same lode, which has a strike of N. 63° E., from Baltic shafts 2 to 5, and to the northward is the Superior mine, on the same bed. The dip of the lode averages about 75°, being the sharpest of any developed cupriferous bed in the Lake district.

The shafts are numbered from south to north, with a distance of 3,025' between the extreme shafts, there being room for one additional shaft at the southern end.

No. 1, the discovery shaft, located between Nos. 2 and 3, was sunk at a wrong angle, and was abandoned at a depth of 219'.

No. 2, the southernmost shaft, on Jan. 1, 1908, was 1,150' deep, and began production 1906. The surface plant at No. 2 includes a boiler-house with two 250-h. p. Stirling boilers; compressor-house with Nordberg air-compressor reducing 4,000' of free air per minute to a pressure of 70 lbs. per square inch, and a Nordberg hoist with double-conical drum. The shaft-rockhouse has a crusher operated electrically, and the shaft has concrete stringers.

No. 3 shaft, 1,170' northeast of No. 2 and 1,500' deep, has a steel shaft-rockhouse, built 1908 by the Wisconsin Bridge & Iron Co. This is of the circular type, with 1,200-ton bins, equipment including a 16x18" engine, two 18x24" Blake crushers and a large crusher operated electrically.

No. 4 shaft, 900' northeast of No. 3 and 1,475' deep, has a frame shaft-rockhouse sheathed with steel, 36x71' with 17x31' wing, 88' high, with 1,400-ton rock-bins and two 18x24" Blake crushers.

No. 5 shaft, the northernmost, 855' northeast of No. 4 and 1,125' deep, has a shaft-rockhouse duplicating that at No. 4. Stoping is in progress on the 13th to 14th levels, inclusive, and drifts have been run to the Atlantic boundary. The ground was considerably disturbed in the upper levels, but is growing more settled at the bottom. Hoist is a duplex Nordberg, good for 1,500' depth.

Hand-power cranes for handling mass copper have been installed at all shafts, and the mine has electric pumps.

The Baltic amygdaloid, taking its name from its first mine, was opened in 1882, but abandoned at 90' depth, because a wrongly pitched drill hole ran into the hanging-wall. The Baltic is an exceptionally strong lode, ranging 15' to 60' in width, so well mineralized that at most point it must be more or less thoroughly beaten away from wall to wall. The great width of the stopes has brought about the use of a walling system, by which waste rock is built into dry-walls along the drifts, thus saving timbering, while giving stronger walls than any timber could supply, and saving the cost of hoisting lean rock. The walling system of the Baltic has proven a success under actual test, and is now in general use in the Lake district, the credit being due Mr. Denton. A little melaconite is found in narrow fissures crossing the lode, these being too small to follow, but the black oxide ore mined in the stopes is saved in the milling, carrying 35% to 40% copper as dressed, and smelts readily with the native copper mineral. The native copper of the Baltic is arsenical, and it is probable that some copper arsenides are mined and milled, as narrow arsenical fissure veins occur occasionally in the district south of Portage Lake. While the finished copper is arsenical, it makes wire of great tensile strength.

The compressor-house, between shafts 3 and 4, is 36x58' in size, with concrete foundations, stone walls and steel roof, housing a compressor with

capacity to reduce 4,000 cubic feet of free air per minute to a press
70 lbs. per inch. Adjoining is a boiler-house of similar material, 49x76'
wing 12x62', having four 250-h. p. Stirling boilers and a 140' self-sup
steel smokestack. This boiler plant supplies steam for shafts 3 and 4
joining the boiler-house is a 360' coal trestle, of 5,000 tons capacity, unde
being a 5x8' concrete tunnel, through which coal is hauled in tram-cars
down grade, by endless cable. There also is a coal trestle at No. 2
There is a 50x132' combination machine shop and smithy, with stone
and steel roof; a 42x72' carpenter shop; a 30x90' miners' changing
supplied with hot and cold water, bath-tubs and lockers; a good office
ing and upwards of 100 well-built dwellings for employes. The mine
complete electric light plant. A considerable town has grown up abo
mine, on lands owned by the company, mine and town being served
Painesdale branch of the Copper Range railroad, and also by a branch
Atlantic railway.

The stampmill, at Redridge, on Lake Superior, one-half mile west
Atlantic mill, went into commission December, 1901, and was enlarge
Building is of structural steel, on stone foundation, equipped with
simple heads of 560 to 625 tons daily capacity each, and 2 Nordberg co
heads of about 800 tons daily capacity each, the second head having be
pleted June, 1908, giving the mill a capacity of about 4,000 tons daily.
foundations are massive, with 90-pound anvil-plates set beneath the
Finisher-jigs and slime-tables were displaced by Wilfley tables, and W
jigs have been added, also Deister concentrating tables for treating t
slimes, both giving good results. The mill has crushing rolls and a Hu
mill for regrinding, and a settling tank for slimes. Mineral return
72% fine copper, and tailings, 1907, carried 0.24% copper, but are expect
reduced, by the settling tank, to about 0.20% copper. The discharge
mill is about 25' above mean water datum, and with a drop of 1 in
vides for the wasting of many million tons of tailings by gravity alon
mill is heated by the Coogan & Strothenke system, air being delivere
4 blowers after previous heating by passing over steam-coils, radiation
coils being insured by a vacuum system. Power is furnished by a 5
Nordberg cross-compound engine, and a 180-h. p. auxiliary engine.

Adjoining the mill is a 55x90' boiler-house, of steel frame on ston
dations, housing five 250-h. p. Stirling boilers and a Green fuel econ
Draft is secured by a set of duplex fans, driven by the mill engine.
the boiler-house is a 25,000-ton coal-storage yard, for the joint use
Baltic and Atlantic mills, coal being brought to the boilers, through
by gravity.

Water for both the Baltic and Atlantic mills is furnished by a $
gravity dam across the mouth of Salmon Trout river, built jointly
Atlantic and Baltic mines. This structure is built of steel and anch
its own weight, irrespective of the holding power of the rock. The pl
suggested by J. F. Jackson, of the Wisconsin Bridge & Iron Co., and
tails were inspected and approved by Foster Crowell. The work r
about 1,000,000 pounds of steel and 8,000 cubic yards of concrete. T
impounds about 1,250,000,000 gallons of water, and at the river's lowes
can furnish water to wash 5,000 tons of rock daily, 300 days yearly, e
a saving over pumping of about 2 cents per ton of rock stamped. T
is anchored in a cement foundation of great strength, and is in 5 s
with a total length of 475', the central or deepest section being 74' hig
wings of 200' on the west and 350' on the east, in comparatively shall
ter, made with cement cores built up from excavations in bed-rock, but

by earth embankments. All 5 sections of the dam proper are of the same general design, the central section being highest, as it is bottomed in the bed of the river, with a wider and heavier concrete base and stronger steel bracing. The dam is of steel throughout, anchored in a concrete base, with braces between the crest of the dam and the extreme foot of the cement base. The following description of the central section will give an idea of the general construction of all 5 parts; the concrete base is 62′ wide, built up from rock excavations. The resultant of all pressures gives a pressure of 2,626,000 lbs. for each steel section of 8′ width and 74′ height. The upper 30′ of the dam in this central section of 100′ is inclined from the water at 45°, throwing the point of overturning within the central third of the concrete base, thus allowing an ample margin of safety. The dam is made of plates of best boiler steel, concave on the water side, 8x16′ in size and 3-8″ thick, riveted and caulked water-tight and supported by parallel inclined "I" beams 24″ thick, for the full depth of 50′ below the crest of the dam. On the lower section the steel plates are each 8x16′ and 3-16″ thick, concave, riveted and caulked, but resting directly against the concrete base. The "I" beams of the upper or main section are supported by heavy triangular frameworks of braced steel columns and struts. The entire steel structure is anchored to a 2″ steel base-plate, at the bottom of the concrete, by a large number of 1½″, 1″ and 2½″ steel rods, of 15′ to 30′ length. Water is taken from the dam about 20′ below the crest by three 38″ riveted steel pipes, one pipe being on the Atlantic and two on the Baltic side. There is a system of valves and waste weirs, but the structure is of such a nature that it could not be injured were water to flow continuously over its crest for an indefinite period. Surmounting this structure is a trestle of the Copper Range railroad, built at the same time, but in nowise a portion of the dam. The center of the railroad track is 7′ above the crest of the dam, 10′ down-stream. In the central section the foundations for the feet of the trestle are all in the concrete work, elsewhere the northern piers for the trestle are separately built.

The Baltic begun production with a leased stamp, August, 1899, starting one stamp in its own mill December, 1901. Production was 2,641,432 lbs. in 1901; 12,177,729 lbs. in 1903; 16,708,868 lbs. fine copper in 1907. The ultimate productive capacity of the mine cannot be predicted with safety, but the present milling capacity is equal to making about 25,000,000 lbs. fine copper yearly, and it is but a question of time when an output of this size will be made, and, ultimately, an even larger production may be secured. The management is in all respects equal to the mine, both being of the best.

BALTIMORE & ARIZONA COPPER CO. **ARIZONA.**

Letter returned unclaimed from former mine office, Turkey, Yavapai Co., Ariz. Lands, known as the Rainbow group, in the Turkey Creek district, are opened by a 75′ shaft, claimed to show a large body of sulphide ore of 2.5 to 3% copper tenor. Presumably idle.

BALTIMORE COPPER CO. **ARIZONA.**

Mine office: Prescott, Yavapai Co., Ariz. Organized 1907 as successor of Chronicle Mining Co. Lands, 6 claims, circa 4 miles east of Prescott, having several shallow shafts.

BALTIMORE COPPER-GOLD MINING CO.

Office: London, Ontario. Location of lands, if any, unknown.

BALTIMORE COPPER & SILVER MINING CO. **MONTANA.**

Letter returned unclaimed from former office, Butte, Mont. Organized circa May, 1907, with capitalization $100,000, shares $5 par.

BALTIMORE COPPER SMELTING & ROLLING CO. **MARYLAND.**

Office and works: Keyser Bldg., Baltimore, Baltimore Co., Md. R. Brent

Keyser, president; Jos. Clendenin and Wm. H. Pierce, vice-presidents; A H. Weld, treasurer. Succeeded the Baltimore & Cuba Smelting & Re Co., which built the first American copper smelter, 1845. Supposedly is trolled by the American Smelting & Refining Co. Plant is located on o the best harbors of the Atlantic coast and having direct rail connectio very advantageously located for both domestic and foreign business. is large and modern, including electrolytic works, bullion refinery, sheet per rolling mill and a bluestone plant. The 100-ton electrolytic refiner eleven 80-kw. generators and 540 tanks, with anodes arranged on both series and multiple plans. Material treated is mainly auriferous and arg erous copper matte from Arizona, Montana and various foreign countries. ploys circa 400 men.

BALTIMORE MINING & DEVELOPMENT CO. MONT.

Mine office: Comet, Jefferson Co., Mont. Lands, 15 claims, in the Bo district. Made, 1907, several small smelter shipments.

BALTIMORE & SONORA GOLD & COPPER CO. ME

Letter returned unclaimed from former office, 909 Maryland Trust Baltimore, Md. Mine office: La Cananea, Arizpe, Sonora, Mex. J. O. ston, president; Chester F. Johnston, secretary. Capitalization $5,0 shares $10 par. Lands, 387 acres, on the western slope of the Cananea tains, showing good outcrops of auriferous copper, carbonates and sil Idle.

BALVANERA MINING CO. ME

Office: 1202-24 Broad St., New York, N. Y. Mine office: Co Rayón, Chihuahua, Mex. Herbert T. Beatty, president; Chas. W. Whit retary and treasurer. Is controlled, through ownership of majority of by Greene Gold-Silver Co. Lands, circa 46,000 acres, in the Ocampo a cheño districts.

BAMBERGER-PIOCHE MINING CO. NE

Office: care of Simon Bamberger, president, Salt Lake City, Utah. office: Pioche, Lincoln Co., Nev. Edward Cutts, superintendent, at I counts. Lands, 12 claims, lying to the westward of the Nevada-Utah- sumably idle.

BANKER'S MINING & DEVELOPMENT CO. ME

Office: care of E. R. Chapman & Co., New York, N. Y. Mine Zautla, San Juan de los Llanos, Puebla, Mex. Chas. Q. Davis, preside L. Wilkins, general manager. Is said to plan a 250-ton smelter.

BANNACK CONSOLIDATED MINING CO. MON

Office: care of Carlton H. Hand, president, Butte, Silver Bow Co., Letter returned unclaimed from former mine office, Bannack, Beaverhe Mont. Organized 1906, with capitalization $1,250,000, shares $5 par. 312 acres, covered with alluvium of 25' to 75' depth, opened by 2 s shafts, showing ores assaying up to 5% copper and $2.40 gold per to

BANNER GOLD & COPPER MINING CO. WASHIN

Mine office: Chelan, Chelan Co., Wash. Dr. J. L. Jacobs, preside W. Eager, secretary. Main tunnel, 101', shows ores assaying up t copper and $15 to $33 gold per ton. Idle.

BARABA MINING CO. WISCO

Office and mine: Mellen, Ashland Co., Wis. Nelson Baraba, Sr., dent; Nelson Baraba, Jr., secretary. Organized 1906, with capitali $1,000,000, shares $1 par. Has a shallow shaft showing ore assaying 2.8 per, with traces of gold and silver.

BARAGUNDA MINES. IN

Mine office: Baragunda, Hazaribagh, Bengal, India. Were operated,

to 1891, turning out about 1,000 tons of copper in five years. Ore occurs as chalcopyrite, running only 1 to 3% copper, in a gangue of micaceous schist. All ore treated was carted 24 miles to the smelter, at Giridhi. These are perhaps the most promising copper properties now known in India, despite the low grade of the ore, and might be worked successfully, if given rail facilities, adequate capital and good management. Idle.

SUCESIÓN DE BARAZARTE. **CHILE.**

Mine office: Paposo, Taltal, Antofagasta, Chile. Property includes the Reventon mine, 400′ deep, and the Abundancia mine, 380′ deep, both opened in 1830, also La Unión mine. Has steam power. Idle.

BARBERTON COPPER CO., LTD. **TRANSVAAL.**

Office: High Court Bldgs., Johannesburg, Transvaal. Mine office: Barberton, Middelburg, Transvaal. T. F. Allen, chairman. Organized July 25, 1907, under laws of Transvaal, as successor of the Barberton Copper Syndicate. Lands, 144 claims, near Noord Kaap. Manager states that he is opening the biggest mining and smelting proposition in South Africa, which seems a rather ambitious statement, in view of the small amount of work accomplished.

BARBERTON COPPER SYNDICATE, LTD. **TRANSVAAL.**

Dead. Reorganized July 25, 1907, as Barberton Copper Co., Ltd. Formerly at Barberton, Middelburg, Transvaal.

BARE HILL MINE. **MARYLAND.**

Office: care of F. R. Van Antwerp, owner, Hornell, N. Y. Letter returned unclaimed from former mine office, Mt. Washington, Baltimore Co., Md. Is an old but slightly developed mine, showing auriferous and argentiferous chalcopyrite and bornite. In 1907 owner planned installing a mine equipment. Idle some years.

BARISTE COPPER CO. **MEXICO.**

Office: 84 Adams St., Chicago, Ills. Mine office: Aguacaliente de Baca, Fuerte, Sinaloa, Mex. John E. Richardson, president; Harry Austin Clapp, vice-president and general manager; Paul H. Seymour, secretary; Edw. R. Austin, treasurer; Daniel H. Livingston, superintendent; preceding officers, with Walden Shaw and Herbert F. Spellman, directors. Organized Feb. 23, 1906, under laws of Arizona, with capitalization $2,000,000, shares $1 par. Lands, 104 hectares, in the Fuerte and Alamos districts, said to show 8 veins, of which 2, under development, of 24′ estimated average width, said to be traceable 1 mile, are slightly developed by tunnel, shafts and trenches, with about 800′ of workings, showing oxidized ores said to average 16% copper and 10 oz. silver per ton.

BARNES COPPER CO. **MONTANA.**

Office: 810-184 La Salle St., Chicago, Ills. F. E. Barnes, superintendent. Capitalization $1,500,000, shares $1 par. Lands are sundry unpatented claims in Granite county, Montana, said to show 2 veins of 4′ width, between diorite and slate, one carrying copper ore and one, of about 6′ width, between quartzite and sandstone, carrying silver-lead ores. Has a 120′ tunnel and several shallow shafts.

BAROTSE COPPER CO., LTD. **RHODESIA.**

Dead. Merged, 1902, in Rhodesia Copper Co., Ltd.

BARRANCA COPPER CO. **MEXICO.**

Office: 170 Broadway, New York, N. Y. Mine office: Barranca de los Andres del Rio, Chihuahua, Mex. H. T. R. Cowell, manager. Claims 6 miles east of a railroad, include La Purisima mine, having [illegible] auriferous copper ores, opened by a 750′ shaft and a [illegible] shipped circa 2,000 metric tons of high grade ore, in [illegible] to have large reserves of low grade copper ore. Has a [illegible]

two 4′ Huntington mills, a 100-ton concentrator and a 60-ton smelter. tiations said to be under way for transfer of property to Anglo-Ame Development Co.

BARSTOW MINING & MILLING CO. COLOR

Office: Titusville, Pa. Mine office: Ironton, Ouray Co., Colo. Jo Carter, general manager; John Geisel, superintendent. Property is the tail group, producing mainly gold, with silver, copper and lead as by-pro Has a 40-stamp mill with steam and electric power, employing about 60

GEWERKSCHAFT BARTHOLOMÄUS. GERM

Dead. Formerly at Menden bei Olpe, Westfalen, Germany. Desc Vol. VI.

BASEL MINING CO. NEV

Dead. Formerly at Tonopah, Nye Co., Nev. In 1907 was opening a in the Lone Mountain district, circa 16 miles west of Tonopah, on a 7 showing auriferous and argentiferous copper ore.

BASIN & BAY STATE MINING CO. MONT

Dead. Property sold July 30, 1907, for $302,865 to the Basin Red Co. Formerly at Basin, Jefferson Co., Mont.

BASIN-COMSTOCK CO. MONT

Dead. Formerly at Cataract, Jefferson Co., Mont.

BASIN GOLD & COPPER MINING CO. MONT

Office: care of E. R. Holden & Co., 20 Broad St., New York. office: Basin, Jefferson Co., Mont. Hon. Robt. B. Smith, president; L. Hewett, vice-president and general manager; B. Lowinson, secreta treasurer. Lands, 280 acres, patented, known as the Hope mine, on considerable development has been secured. Company is entangled in tion and apparently hopelessly involved.

BASIN REDUCTION CO. MON

Works office: Basin, Jefferson Co., Mont. W. A. Kidney, superint Is controlled by La France Copper Co., which is dominated by United Co. In August, 1907, bought the mill and smelter of the Basin & Ba Mining Co. and the Katie mine, at sheriff's sale, for $302,865. Mill is o 1,200 tons daily capacity. Has had some trouble with the county aut because of polluting streams with tailings, but has built large dams to h slimes.

BASLER MINING & DEVELOPMENT CO. CALIFO

Office: 904 J St., Sacramento, Cal. Mine office: Lowry, Tehar Cal. Dr. D. L. McLean, president; W. L. Rennie, secretary and treasu M. Basler, general manager. Organized under laws of California, with talization $200,000, shares $1 par. Lands, 14 claims, partly patented, 5-acre millsite and 320 acres miscellaneous lands, opened by a 1,200′ with 3,000′ of underground openings, showing 3 ore bodies, one of 2′ width, giving average assays of 2% copper, 2% lead, and $1 to $3 gol ton, from malachite, bornite and chalcopyrite.

JOHN BATES. BOL

Office and mine: Coro Coro, La Paz, Bolivia. Property is the Tomás mine, carrying native copper in conglomerate. Has steam power a small producer of barrillas de cobre.

BATES MINING & SMELTING CO. MASSACHUS

Dead. Formerly at Charlemont, Franklin Co., Mass. Described Vo

BATTLE COPPER MINING CO. WYOM

Succeeded circa 1907 by Portland Copper Mining Co. Formerly at Carbon Co., Wyo. Described Vol. VI.

BATTLE LAKE & BATTLE CREEK MINING CO. **WYOMING.**

Office: care of N. B. Noble, Rice Lake, Wis. Mine office: Battle, Carbon Co., Wyo. Idle.

BATTLE LAKE TUNNEL SITE MINING CO. **WYOMING.**

Office: 731 Monadnock Block, Chicago, Ills. Mine office: Rudefeha, Carbon Co., Wyo. E. M. Cobb, president. Organized 1900, under laws of Wyoming, with capitalization $2,500,000, shares $1 par. Is controlled, through stock ownership, by Penn-Wyoming Copper Co. Lands, 30 claims, area 600 acres, also 80 acres miscellaneous lands.

BATTLE MOUNTAIN COPPER MINING CO. **WYOMING.**

Dead. Formerly at Encampment, Carbon Co., Wyo.

BATTLESHIP MINING & MILLING CO. **NEW MEXICO.**

Office: 412 Mack Bldg., Denver, Colo. Letter returned unclaimed from former mine office, Lordsburg, Grant Co., N. M. Dr. O. L. Blachly, president; O. B. Crum, secretary and treasurer. Capitalization $100,000, shares $1 par. Lands, 2 groups of 2 claims each, area 79 acres, in the Virginia district, three to four miles from Lordsburg, connected therewith by a good wagon road. Property has no surface improvement, but is opened by 478′ of shafts, crosscuts, and opencuts, showing ores that are said to have given average returns, from smelter shipments to El Paso, of 8 to 14% copper, 1 to 20% lead, 22 oz. silver, and $10 to $20 gold per ton. Idle and apparently moribund.

BAUMANN COPPER CO. **ARIZONA.**

Office: 407 Keystone Bldg., Pittsburg, Pa. Mine office: Humboldt, Yavapai Co., Ariz. Thos. G. McClure, president; H. L. Dooley, vice-president; W. H. McClelland, secretary; R. Johnston, treasurer; J. M. McNeal, managing director. Organized Aug. 3, 1901, under laws of Arizona, with capitalization $600,000, increased, 1907, to $1,500,000, shares $1 par. Has an issue of 5-year 6% convertible bonds. Was practically reorganized, 1907. Annual meeting, first Monday in November.

Lands, 25 claims, area 500 acres, unpatented, in the Agua Fria district, including the Swiss Girl mine. Country rocks are quartz-porphyry and slate, principal veins occurring as fissures in quartz-porphyry, with [illegible] on footwall. Ores are cuprite, malachite and azurite above, with [illegible] below, giving assays of 14 to 42% copper, from a trace to [illegible] silver, and from a trace to $33.50 gold per ton. Development is by 11 [illegible] three of 208′, 214′ and 690′, with 8 under 200′ depth, and by tunnels of 150′, 200′, and 305′, with a total of 2,650′ of underground openings. Equipment includes a 25-h. p. hoist, good for 1,500′, an 80-h. p. boiler, 2-drill Sullivan compressor, 2 power drills and several small mine buildings. Property considered promising. Idle at last accounts, but resumption planned.

SOCIEDAD MINERA y FUNDICIÓN DE **AR[illegible]**
RAUSCH y TIANI.

Office, mine and works: Chilecito, Rioja, Argentina. Property includes the Compañia and Mercedes mines. Has steam and water power [illegible] known as the San Miguel, built 1876, for lead ores, at a cost of [illegible] altered, 1893, to treat copper ores of the Mexicana district.

BAY COPPER MINES, LTD.

Office: 142 Palmerston House, London, E. C., Eng[illegible] managing director; W. R. Caldwell-Moore, secretary. Organized [illegible] with capitalization £35,000, shares £1 par; issued, £15,[illegible]. Idle copper mine, but location unknown.

BAY HORSE COPPER MINING CO. **[illegible]AL.**

Dead. Formerly at Riverside, Carbon Co., Wyo. [illegible]par;

BEACON CONSOLIDATED MINES CO. COLORADO & ME

Office: 609 Mack Bldg., Denver, Colo. Letter returned unclaimed former mine office, La Cananea, Arizpe, Sonora, Mex. Lloyd Kenyon secretary, treasurer and promoter. Has two gold claims, on Beacon Cripple Creek, Teller county, Colorado, and in June, 1907, claimed acquiring 40 to 50 pertenencias of copper ground at La Cananea.

BEAD LAKE GOLD-COPPER MINING & MILLING CO. WASHIN

Office: care of W. E. Allen, secretary, Spokane, Wash. Mine office: port, Stevens Co., Wash. B. F. Seeley, president; O. L. Smith, superinte Organized, 1901, under laws of Washington, with capitalization $3,0 shares $1 par. Lands, 13 claims, area 267 acres, developed by a 2,065' t showing sulphide ore. Has steam power and air-compressor. Was explori diamond drill at last accounts.

BEAN AMALGAMATED COPPER CO. NEW ME

Letter returned unclaimed from former mine office, Lordsburg, Gran N. M. Organized 1907, under laws of Arizona, with capitalization $6,00 Lands, 600 acres, formerly known as the Bean & Good claims, in the S speare district, shortly south of Lordsburg.

BEAN COPPER CO. ARIZ

Dead. Formerly at Gila Bend, Maricopa Co., Ariz.

BEAR GULCH MINING CO. MONTA

Office and mine: Twin Bridges, Madison Co., Mont. Alex. Johnson, ma ager; Edson C. Baxter, superintendent. Property is the Mountain Vi group, carrying auriferous and argentiferous copper ores, opened by tunn Has steam power.

BEAR MOUNTAIN MINING & DEVELOPMENT CO. WASHINGTO

Mine office: Colville, Stevens Co., Wash. C. G. Carruthers, superintende at last accounts. Has argentiferous and auriferous copper ore, opened by tunnel.

BEAR MOUNTAIN TUNNEL & MINING CO. COLORADO.

Mine office: Crystal, Gunnison Co., Colo. H. H. Williams, superintendent, at last accounts. Has argentiferous and slightly auriferous copper ores, opened by tunnel, with water power.

BEAR TOOTH GOLD & COPPER MINES CO. CALIFORNIA.

Letter returned unclaimed from former office, Redding, Cal. Organized October, 1907, under laws of California, with capitalization $900,000, by F. P. Burrie, Robt. Duffy, W. A. Courey, W. A. Bender and H. W. Leach. Lands, 14 claims, in Trinity county, California, said to have 14 parallel veins carrying auriferous and argentiferous copper ore, these ranging from a few inches to several feet width, and said to give average assays of 4% copper, 5 oz. silver and $15 gold per ton. Has a shallow shaft and a 500' tunnel, with considerable trenching.

BEATRICE MINING & MILLING CO. MONTANA.

Mine office: Elliston, Powell Co., Mont. D. G. Barringer, president; A. McNaughton, secretary and general manager; Abner Knapp, superintendent. Has ores of gold, silver, lead and copper, opened by tunnel. Has steam power and a 10-stamp mill.

A. K. BEATSON. ALASKA.

Business of Bonanza mine is done in name of A. K. Beatson.

BEAUPARK COPPER MINES CO., LTD. IRELAND.

Office: 36 College Green, Dublin, Ireland. W. Hume and D. Frame, directors. Organized Feb. 12, 1908, under laws of Great Britain, with capitalization £1,000, shares £1 par, to acquire mineral lands in County Meath, Ireland.

BEAVER CAÑON GOLD & COPPER MINING CO. **WASHINGTON.**

Mine office: Loomis, Okanogan Co., Wash. E. P. Gaillac, manager. Lands, sundry claims, circa 8 miles south of Loomis.

BEAVER CARBONATE MINING CO. **UTAH.**

Office: Salt Lake City, Utah. Mine office: Frisco, Beaver Co., Utah. Lands, 2 miles north of Frisco, have a 553′ shaft.

BEAVER CONSOLIDATED MINING CO. **UTAH.**

Dead. Merged, 1904, in Beaver-Harrison Mining Co. Formerly at Milford, Beaver Co., Utah.

BEAVER COPPER CO. **UTAH.**

Office: 222 D. F. Walker Bldg., Salt Lake City, Utah. Maj. Henry Catrow, president and general manager; A. J. Bettles, first vice-president; A. J. McMullen, second vice-president; A. D. McMullen, secretary; H. P. Clark, treasurer; preceding officers, Jos. H. Patterson, A. D. Moffat and Paul E. Banker, directors; D. P. Rohlfing, consulting engineer. Organized 1906. Lands, 14 claims, in the Beaver Lake district, showing a strong vein traceable about 1 mile, giving assays of 4 to 25% copper and up to 70 oz. silver, opened by a 100′ shaft showing 10% chalcopyrite at bottom. Under former ownership desultory mining operations produced a little high-grade ore.

EAVER COPPER MINING CO. **WYOMING.**

Dead. Wound up. Formerly at Downington, Carbon Co., Wyo. Described Vol. V.

EAVER-HARRISON MINING CO. **UTAH.**

Office: 23 Eagle Block, Salt Lake City, Utah. Mine office: Milford, rer Co., Utah. J. J. Trenam, president and manager; E. H. Jacobs, treas-r; B. L. Corum, secretary. Organized 1904, with capitalization $75,000, es 5 cents par, as a merger of Beaver Consolidated Mining Co. and Harrison Gold & Copper Mining & Milling Co. Lands, 21 claims, area acres, in the Beaver Lake district, one group being near the O. K. mine of Majestic company, showing sundry fissure veins, opened by 2 shafts of 300′ 534′, with about 2,000′ of workings, showing a 10′ ore body assaying 5 to copper, and up to 10 oz. silver and $7 gold per ton. Has steam power and r-compressor, with necessary mine buildings. Presumably idle.

VER LAKE COPPER CO. **PENNSYLVANIA.**

Mine office: Bloomsburg, Columbia Co., Pa. Has secured ores assaying copper. Idle.

VER MOUNTAIN MINING CO. **ALASKA.**

Mine office: Sulzer, Prince of Wales Island, Alaska. Henry Miller, presi-George Comer, manager. Lands, sundry claims on the south side of r Mountain, Hetta Inlet. Development is by tunnels, showing ore carry-opper, nickel and cobalt. Idle.

VER VALLEY MINING & LAND CO. **COLORADO.**

Office: care of E. P. Castor, secretary and treasurer, Boulder, Colo. returned unclaimed from former mine office, Rosemont, Teller Co., Colo. Peck, president; Jas. F. Smith, consulting engineer. Lands include mining claims, water rights and a dam. Has 2 shallow shafts and a tunnel, showing a quartz vein giving fair assays in copper, silver and Was developing with a small force at last accounts.

ER COPPER CO. **ARIZONA.**

Mine office: Clifton, Graham Co., Ariz. Said to have been absorbed, 1907, pper Company of Arizona.

MANN COPPER MINING & DEVELOPMENT CO., LTD. **TRANSVAAL.**

Office: Johannesburg, Transvaal. Capitalization £6,000, shares £1 par;

working capital, £2,000. Lands, 192 base metal claims, in the Zoutpansberg district, northern Transvaal, slightly prospected.

BEDE METAL & CHEMICAL CO., LTD. **NORWAY & SPAIN.**

Office: Hebburn-on-Tyne, England. General Spanish office: Manriques 9, Córdoba, Spain. Mine office: Puebla de Guzmán, Huelva, Spain. Sir Andrew Noble, Bart., K. C. B., chairman; preceding officer, W. D. Cruddas, Sir Walter Scott, Bart., Alfred M. Palmer and Mason T. Scott, directors; W. W. Brown, secretary; Richard Eshott Carr, general manager; Chas. S. Sams, superintendent. Organized 1870, under laws of Great Britain, with capitalization £288,400, shares £25 par, since reduced to £115,360, shares £10 par, and, in 1908, reissued in 115,360 shares, £1 par. Dividends, 1879-1907, were £108,464. Dividends 1906 were £14,320, and 1907 were £20,048. Statement, as of Jan. 1, 1908, gave assets of £114,427, liabilities £135,763; cash on hand, £49,005. Is primarily a manufacturer of acid and chemical products, but is a considerable producer of copper, from Spanish and Norwegian cupriferous pyrite.

Spanish lands, 71 hectares, leasehold, expiring 1942, include Las Herrerias mine, which has 7 workings in 2 groups. Main ore body is a large, irregular mass of solid cupriferous pyrite, in schist, with dip from vertical to 40° N., there being 7 ore bodies, of which 6, under development, range 1 to 40 meters in width, with extreme length of 400 meters, ore averaging about 1.75% copper and 47% sulphur. Mine is opened by shafts of 246', 185' and 186', with about 200,000 tons of ore blocked out. The western portion of the mine is worked open-cast, while in underground workings all ore is removed and openings filled with waste.

Mining equipment includes a locomotive, 2 hoists, machine-shop, smithy, carpenter-shop, office building, warehouses, 4 engine-houses and 25 dwellings. Ore as mined is piled on large flat-topped heaps, which are irrigated regularly, the resulting liquors being passed over iron for precipitation. There are 2 fresh-water dams and 4 leaching dams, of masonry. Precipitate ranges 70 to 80% copper, and is shipped to company's smelters at Hebburn-on-Tyne for reduction. Cost of copper, in precipitate, on board steamer, averages about £50 per long ton, including royalties, development charges and general expenses. Ore in leach-heaps is charged to general production, company's balance sheet concealing rather than padding actual assets. Production of Spanish mines, 1907, was 1,276,800 lbs. fine copper, secured with a force of circa 300 men.

The Killingdal mine, north of Röros, Norway, is operated under lease from Norwegian owners. Ore is cupriferous pyrite, averaging about 1.5% copper and 45% sulphur. Production, 1905, with an average force of 100 men, was 11,600 tons of ore, yielding 512,960 lbs. fine copper. A continuation of the main lode, discovered 1905, materially improves the prospects of the mine. Company is conservatively and successfully managed.

BEECHWORTH GOLD MINING SYNDICATE. **AUSTRALIA.**

Mine office: Cobar, Robinson Co., N. S. W., Australia. Lands, sundry claims 6 miles north of the Queen Bee mine, carrying a promising gossan containing gold, silver and copper values, opened by a 200' shaft showing auriferous and argentiferous copper and lead ores.

BELCHER MINING CO. **WASHINGTON.**

Office: Spokane, Wash. Mine office: Republic, Ferry Co., Wash. Jos. A. Anderson, president. Mine is opened by three tunnels, of which No. 3, the 1,000' main tunnel, shows a large body of medium-grade ore carrying a 2' footwall paystreak of high-grade chalcopyrite. Has a 1,000' aerial tram connecting 3 main adits with railroad bins. Water, brought 2,000' from Lambert Creek, through a steel pipe, generates electric power, and gasoline power is used also. Has 8 power drills. Property is considered promising.

BELCHER MOUNTAIN GOLD & COPPER CO. **MONTANA.**

Mine office: Republic, Ferry Co., Wash. Is said to plan building a 500-ton smelter.

BELENE COPPER CO. **MEXICO.**

Office: 733-145 South Spring St., Los Angeles, Cal. Mine office: El Copete, Carbó, Ures, Sonora, Mex. J. J. Hardwick, president and general manager; S. E. Hostetter, vice-president; Harry R. Hay, secretary and treasurer; preceding officers, W. L. Hardwick and G. A. Willcox, directors. Organized Nov. 25, 1901, under laws of Arizona, with capitalization $5,000,000, shares $5 par. Registered and protocolized June, 1902, under laws of Mexico.

Lands, 162 hectares, circa 24 miles from Carbó, the nearest railroad station, lying west and north of the Copete mine and near the Sultana mine of the Giroux Consolidated. Mine has shaft of 310', 256', 185', 90', and several tunnels, with circa one-half mile of workings, on 2 large sulphide ore bodies, claimed to give average assays of 12% copper, 8 oz. silver and $10 gold per ton. Has steam and electric power. Idle since circa 1903, except for shipment, May, 1907, of 70 tons of ore to El Paso smelter, which returned nearly $2,250.

BELEN MINING CO. **MEXICO.**

Office: 12 Chamber of Commerce Bldg., Minneapolis, Minn. Mine office: Cumpas, Moctezuma, Sonora, Mex. Chas. E. Wenzel, president; John E. Stair, vice-president; Ace P. Abell, secretary and treasurer; preceding officers, Chas. W. Sexton and Lyman W. Dickerson, directors; R. L. Van Dusen, superintendent; T. F. Janes, mine superintendent. Organized May 20, 1901, under laws of South Dakota, with capitalization $1,200,000, shares $10 par.

Lands, 190 hectares, also 14,000 acres of ranch and timber lands. Property shows 8 ore bodies, of which 5 have been more or less developed by 5 shafts and 3 tunnels, showing a vein of about 90' width, with a 2' paystreak of high grade ore averaging circa 8% copper, 20 to 30 oz. silver and 0.09 to 0.5 oz. gold per ton, from chalcocite, bornite, chalcopyrite and tetrahedrite, ores being bismuthiferous.

Equipment includes a steam and electric power plant, with 2 electric hoists and electric lights. There are about 10 buildings, including necessary shops. Transportation is by wagon road from Dos Cabezos mine to Cumpas, via the Transvaal mine.

Smelter has a rotary calciner and 30-ton Medberry revolving reverberatory furnace, but this plant, blown in 1908, did not give satisfactory results, for some reason, and was closed down after a short run. Some copper ore has been shipped to the Copper Queen and El Paso smelters, and 8 carloads of bismuthiferous ore have been shipped to England.

SOCIÉTÉ ANONYME BELGE POUR LA RECHERCHE ET L'EXPLORATION DES MINERAIS. **ITALY.**

Mine office: Massa Marittima, Grosseto, Tuscany, Italy. Is a Belgian company, operating a mine of slightly cupriferous iron pyrites.

COMPAGNIE DES CUIVRES DE BELGIQUE. **BELGIUM.**

Office: 17 Quay Napoleon, Antwerp, Belgium. Works office: Duffel, Belgium. Employs circa 60 men. Marquis de St. Seine, chairman; Louis J. Burkel, commercial director; H. de Montagu, metallurgical director; Herman G. C. Thiehrn, consulting engineer. Organized April, 1905, under laws of Belgium, with capitalization 500,000 francs, shares 500 f. par. The smelter, at Duffel, a suburb of Antwerp, and connected therewith by water, has a 250-ton blast furnace and five 100-ton reverberatory furnaces.

BELLA COOLA COPPER CO. **BRITISH COLUMBIA.**

Office: 606 First Ave., Spokane, Wash. Provincial office: Bella Coola,

Cassiar district, B. C. V. M. Scribner, president; S. S. West, vice-pr R. R. Swim, treasurer. Organized August, 1906, under laws of Was with capitalization $2,000,000, shares $1 par, and registered, 1907, un of British Columbia, as an extra-provincial company. Lands, 9 clai 450 acres, at tidewater, on the Burke channel, on Bella Coola M circa 400 miles north of Vancouver. The Burke mine has been d slightly by trenching.

MINA BELLAVISTA. M

Office: care of Henry L. Choistry, owner, Guadalajara, Jal., Mex office: Etzatlán, Jalisco, Mex. Lands, 14 pertenencias, just east of E showing 7 veins, two averaging 1 metre in width, slightly developed b 95 metres of workings, showing argentiferous and auriferous copp Property is an antigua, formerly known as the Picachos. Idle.

BELL-DOMINION COPPER MINING CO. AR

Office and mine: Globe, Gila Co., Ariz. Organized August, 190 capitalization $250,000. Lands, 10 claims, known as the Scotch grou of Pinal Creek. Had a 70' shaft at last accounts. Presumably idle.

BELLE OF GRANITE MINE. COL

Mine office: Granite, Chaffee Co., Colo. B. H. Pelton, superin at last accounts. Lands, sundry claims, developed by a 475' shaft, bott a very narrow but rich vein, claimed to average about 32% copper, silver and $120 gold per ton.

BELL MARE COPPER MINING & SMELTING CO. NE

Dead. Merged, 1902, in the Nevada Bell Copper Mining & Reduc Formerly at Lovelock, Humboldt Co., Nev.

MINA BELL. M

Office: care of Robert Tate, manager, Bisbee, Ariz. Mine office: Fr Arizpe, Sonora, Mex. Lands, sundry claims, circa 18 miles west of Fr showing rich auriferous and argentiferous copper ores. Presumably id

BELL MINE. MON

Owned by Anaconda Copper Mining Co.

BELMONT MINE. MON

Owned by Butte Coalition Mining Co.

BELLONA MINE. MON

Owned by Parrot Silver & Copper Co.

BELMONT-CHEMUNG MINING CO. COL

Mine office: Black Hawk, Gilpin Co., Colo. Ores carry gold, sil copper. Has steam power. Presumably idle.

BELMONT MINING CO. COL

Mine office: Winfield, Chaffee Co., Colo. Has gold-silver-copp opened by tunnel. Presumably idle.

BELMONT MINING CO. MON

Dead. Property sold, 1906, to Butte Coalition Mining Co. Form Butte, Silver Bow Co., Mont.

BEN BUTLER MINING & MILLING CO.

Dead. Was merged, 1903, in the Butler-Liberal Consolidated Min Formerly at Bingham Canyon, Salt Lake Co., Utah.

BENEDICTINE MINING CO. AR

Letter returned unclaimed from former mine office, Cedar, Moha Ariz. Lands are known as the Cedar group. Suspended operation July, 1907, but is said to have been practically reorganized, and resumption.

COMPAÑIA BENEFICIADORA DE MINERALES, S. A. M

Is the Mexican incorporation of the National Smelting Co.

ANKLIN GOLD MINING CO. **WASHINGTON.**
office: Bossburg, Stevens Co., Wash. Property is a prospect, showing copper ores. Idle.

RRISON GOLD & COPPER MINING CO. **WASHINGTON.**
Jeffersonville, Ind. Mine office: Chesaw, Okanogan Co., Wash. Holzboy, president; Basil Doerhoefer, vice-president; C. J. Weivel, Geo. F. Edgington, treasurer and general manager; preceding officers, beson and John Sidler, directors; Jas. P. Blaine, superintendent. April, 1903, under laws of Washington, with capitalization $1,000,000, par. Lands, 6 claims, area 120 acres, in the Myers Creek ened by a 140′ shaft and 1,100′ tunnel, showing mainly auriferous ore. Has a 12-h. p. gasoline hoist, 25-ton concentrator and several ings.

RISON GOLD & COPPER MINING & MILLING CO. **UTAH.**
Merged, 1904, in Beaver-Harrison Mining Co. Formerly at Mil-er Co., Utah.

COPPER MINING CO. **WYOMING.**
710-34 South Clark St., Chicago, Ills. Letter returned unclaimed er mine office, Encampment, Carbon Co., Wyo. Chas. G. Mason, R. B. Short, vice-president; Clifford M. Miller, secretary and treas-nized November, 1902, under laws of Wyoming, with capitalization shares $1 par. Lands, 4 claims, 3 patented, area 80 acres, in the e district, opened by a 350′ tunnel, planned to cut a sulphide ore pping on surface. Presumably idle.

GOLD MINING CO. **WASHINGTON.**
Reorganized, 1906, to raise new capital, as Ben Hur Mining & Formerly at Republic, Ferry Co., Wash.

MINING CO. **MONTANA.**
ffice: Saltese, Missoula Co., Mont. Geo. H. Keep, president; Frank resident and general manager; F. H. Bell, secretary; Chas. Keating, Richard Daxon, manager; preceding officers and Geo. Trask, directors. said to have a 25′ vein, in quartzite, carrying gray copper and lead ning fair gold values.

MINING & MILLING CO. **WASHINGTON.**
ffice: Republic, Ferry Co., Wash. S. P. Domer, manager. Organ-with capitalization $1,000,000, shares $1 par, as a reconstruction of ir Gold Mining Co. Mine, opened by shaft, shows ore values mainly d silver, with a little copper. Has steam power. Late 1905 was rea 25 tons of ore daily.

A MINERA BENITO JUÁREZ. **MEXICO.**
ffice: Peñón Blanco, Cuencamé, Durango, Mex. Has argentiferous ous copper ores, employing about 40 men at last accounts.

BENTON. **MEXICO.**
ffice: Culiacán, Sinaloa, Mex. Has ores carrying gold, silver and ploying 20 men at last accounts.

EN COPPER MINES, LTD. **IRELAND.**
Formerly at Allihes, County Cork, Ireland. Described Vol. VI.

UND EISENHÜTTEN GEWERKSCHAFT. **AUSTRIA.**
office: Witkowitz, Austria. Has a small reduction plant, with elec-inery having 72 tanks, with electrodes arranged on the multiple daily capacity of about 600 pounds of finished copper.

Y MINE. **MONTANA.**
by Butte & Boston Consolidated Mining Co.

BERLIN MINE. MONT

Owned by North Butte Mining Co.

BERLIN MINING & DEVELOPMENT CO. MONT

Mine office: Butte, Silver Bow Co., Mont. Wm. D. Thornton, J Slemons and Jas. T. Steele, directors. Organized Apr. 10, 1905, unde of Montana, with capitalization $200,000, shares $10 par. Out of bu and will be wound up as soon as money now in litigation, paid for claim by North Butte, can be distributed.

JOSÉ BERNARDINO. ME

Office and mine: Nombre de Dios, Durango, Mex. Was a very small producer at last accounts.

BERNICE & RED ROCK MINING CO. MONT

Office: 15 Bee Hive Blk., Butte, Mont. Lands, 12 claims, a millsit water right, on Red Rock Creek, circa 3 miles north of Bernice, Je County, Montana, which is not a postoffice. Mine has several tunnels, aggregate length, showing a 15′ vein with 4′ paystreak, from which s samples gave average assays of 4.4% copper, 21.2% lead, 9.8 oz. silver cents gold per ton. Leasers, circa 1902, shipped a little ore.

BERNOUDY MINING & MILLING CO. ARI

Office and mine: Paradise, Cochise Co., Ariz. Wm. P. Wright, pre Fred G. Bernoudy, vice-president and general manager; Geo. A. Walker, tary; Henry C. Chamberlain, treasurer; preceding officers are the di Organized 1906, under laws of Arizona, with capitalization $1,000,000, $1 par. Lands, 5 claims, one-half mile northeast of Paradise, opened by A smelter shipment, 1906, gave returns of 4% copper, 151 oz. silver a oz. gold per ton.

BERSBO KOPPARVERK. SW

Is the smelting plant of the Aktiebolaget Atvidabergs Kopparver

SUCESIÓN NOEL BERTHÍN. BO

Office: 74 Rue de Rennes, Paris, France. Mine office: Coro Coro, Bolivia. Ange Berthin, agent. Employs circa 450 men. Property Guallateri mine, 2 kilometers from the city, having a separate mining with about 2,000 population. Property carries cupriferous conglo copper occurring native. Main shaft is 1,100′ deep and mine has been for length of circa 1,300 meters, with machinery plant midway. Prope a reduction plant, known as the Acourni, near the mine, and is the largest copper producer of Bolivia, the Bolivian government estimat cost, per quintal of barilla de cobre, of 80% copper tenor, at 6.5 b Production, 1903, was 2,028,232 lbs. fine copper.

BERTRAND COPPER CO. ARI

Mine office: Clifton, Graham Co., Ariz. Idle.

BESA y CA. C

Dead. Property sold, November, 1906, to Société des Mines et Usi Cuivre de Chañaral. Described Vol. VI.

BESSEMER COPPER MINES CO. NEW ME

Mine office: Fierro, Grant Co., N. M. Lands include the Conti Iron Head and Anson S. mines, latter said to produce ore of 7% copper opened by a 200′ shaft. Property was worked formerly for iro having been leased by the Bessemer Iron Association and Colorado Iron Co. Extraction of copper by latter was stopped, by injunction, lea ing for mining of iron ore only. Company is said to plan a 100-ton smel

BESSEMER IRON ASSOCIATION. NEW ME

Office: Hanover, Grant Co., N. M. Mine office: Fierro, Grant Co., Copper properties are leased to the Bessemer Copper Mines Co.

BIGELOW GOLD & COPPER MINING CO. NEW MEX

Dead. Was organized by same people as the Victoria Chief. Form at Hillsboro, Sierra Co., N. M.

BIG HORN MINING CO. ARIZ

Letter returned unclaimed from former mine office, Wendendale, Co., Ariz. Was prospecting, late in 1907, and was said to have found good ore at shallow depth.

BIG HORN MINING CO. COLOR

Mine office: Pearl, Larimer Co., Colo. Has a 50′ shaft, on the Co Queen group, bottomed in a 5′ vein claimed to assay 20% copper. Idle.

BIG INDEX GOLD & COPPER MINING CO. WASHING

Office: 419 Pioneer Bldg., Seattle, Wash. Mine office: Index, Snoho Co., Wash. Wm. Frankfurt, president; J. C. Rathbun, secretary; Ed Aegerter, superintendent. Organized 1902, under laws of Washington, capitalization $2,500,000, shares $1 par. Lands, 15 claims, area 300 acr miles from a railroad, in the Washington district, opened by a 350′ tu showing ores giving average assay values of $26 per ton, in copper and principally latter. Idle.

BIG INTERIOR MINE. BRITISH COLUM

Mine office: Alberni, Vancouver Isld., B. C. Lands, 7 claims, area acres, at the head of Great Central Lake, 12 miles from Alberni, at an e tion of 5,000′ above sea-level. Property shows a brecciated zone with siderable impregnation of copper carbonates, low in grade, but with o immense quantities, and apparently available for concentration, if g transportation facilities, mine being very difficult to reach by present Only development is a 31′ tunnel. Idle.

BIG LEAD MINING & SMELTING CO. ARIZ

Dead. Merged, circa July, 1907, in Kelvin-Calumet Copper Mining Formerly at Kelvin, Pinal Co., Ariz. Described Vol. VI.

BIG SHOW SILVER & COPPER MINING CO. MONTA

Mine office: Twin Bridges, Madison Co., Mont. Organized under law Arizona, with capitalization $1,500,000, shares $1 par. Lands, 4 claims, s ing auriferous and argentiferous copper ores. Presumably idle.

BIG SPRINGS MINING CO. ARIZ

Mine office: Paradise, Cochise Co., Ariz. C. W. McCoy, manager. ganized 1907. Lands, variously reported as 7 or 11 claims, are known as Claire group, near Wood Cañon. Shipped a little ore before present ov ship. Vein has a 2′ paystreak, carrying mainly silver-lead ore, with a argentiferous copper ore, all more or less auriferous, opened by a 165′ tu Silver-lead ores are shipped to El Paso smelter, and copper ores to the D las smelter. Employs 10 men.

BIG YANK MINING & MILLING CO. ORE

Office: 414 Abington Bldg., Portland, Ore. Mine office: Galice, phine Co., Ore. J. C. Mattison, superintendent, at last accounts. Has a erous and argentiferous copper ores. Idle.

MINAS BILBAINAS. SP

Office: care of Aznar y Ca., owners, Bilbao, Spain. Mine office: Pain Huelva, Spain. Property is the eastward extension of La Romanera g with a promising showing of ore. Presumably idle.

COMPAÑIA MINERA BILBAINO ASTURIANO. SP

Office: Bilbao, Spain. Is controlled, through stock ownership, by Fulano Copper Mines, Ltd. Lands, 214 acres, in the province of Astu Spain, including 5 copper and 3 zinc properties.

BILLION DOLLAR QUEEN MINING CO.

Dead. A stock-jobbing scheme, promoted by a petticoat grafter called Mrs. Van Arsdale, née Estella Trunnel, alias Mrs. Estella True-Nell.

BI-METALLIC GOLD & COPPER MINING CO. **WASHINGTON.**

Letter returned unclaimed from former mine office, Loomis, Okanogan Co., Wash. Lands, sundry claims, slightly developed by tunnel.

BINGHAM AMALGAMATED COPPER CO. **UTAH.**

Mine office: Bingham Canyon, Salt Lake Co., Utah. Jos. Edmunds, general manager. Property includes the Illinois and Copper Glance groups, former having a vein of about 9' width, carrying a 2' paystreak of 5% copper ore, some ore assaying up to 40% copper. The average of 50 assays, for the entire vein, gave 2.8% copper, 6 oz. silver and $2 gold per ton. The Copper Glance group has an 1,800' tunnel, in McGuire Gulch. The Amalgamated group is said to show, on the 300' level, an ore chute of 60' width, averaging 4.5% copper and $1.20 gold per ton. Equipment includes an electric plant. Some ore has been shipped. Property considered promising.

BINGHAM ARGENTINE COPPER CO. **UTAH.**

Office: 1401-56 Broadway, New York, N. Y. Mine office: Bingham Canyon, Salt Lake Co., Utah. A. T. Wright, president; John Dern, vice-president; Wm. H. Iglehart, secretary; P. T. Farnsworth, treasurer. Organized 1907, under laws of Utah, with capitalization $1,000,000, shares $1 par. Lands, circa 160 acres, on Sheep Mountain, near the Utah Consolidated and Bingham-New lands.

BINGHAM-BAY STATE COPPER CO. **UTAH.**

Office: 161 Devonshire St., Boston, Mass. Mine office: Bingham Canyon, Salt Lake Co., Utah. E. Harding Dickinson, president; W. G. Brown, secretary and treasurer; John E. Cotter, general manager; Jos. Kauffman, director; Prof. G. Tibbitts, financial agent. Organized under laws of Utah, with capitalization $1,000,000, shares $1 par. Lands, 18 claims, at the head of Butterfield Cañon, formerly known as the Mt. Aetna group, adjoining the Last Chance mine of the Nevada-Utah. Mine has 3 tunnels, No. 1 being 600', No. 2 about 300' and No. 3 being 290' in length, latter planned to cut vein at depth of about 1,200'. No. 1 tunnel has a Fairbanks & Morse engine and air-compressor. Has secured ore assaying 15% lead, 3.4 oz. silver and $10.40 gold per ton, with occasional copper values. Officers stand well and developments have been pushed systematically and vigorously.

BINGHAM-BUTTE COPPER MINING CO. **UTAH.**

Mine office: Bingham Canyon, Salt Lake Co., Utah. John T. Cowan, president and general manager; Geo. A. Bellinger, superintendent. Organized circa 1907, with capitalization $5,000,000, shares $5 par, as successor of Copper Hill Mining Co. Lands, 240 acres, including the Copper Hill group, opened by 2 tunnels, on the Caledonia fissure, upper tunnel giving ore assaying up to 25% copper, 5% lead, 26 oz. silver and $5 to $9 gold per ton. Also has a 2' vein of ore said to assay 5% lead, 55 oz. silver and $11 gold per ton. Has shipping-bins at mouth of lower tunnel, at the railroad track.

BINGHAM CENTRAL MINING CO. **UTAH.**

Mine office: Bingham Canyon, Salt Lake Co., Utah. Samuel Newhouse, president; H. P. Clark, treasurer; D. C. Jackling, managing director. Capitalization $5,000,000, shares $5 par. Has a bond issue of $250,000, apparently convertible into stock at $2 per share. Is controlled, through ownership of practically entire stock issue, by Bingham Central-Standard Copper Co.

Lands, 190 acres, patented, developed by 2 tunnels, these being known as the upper or Whiteley tunnel, of about 2,000' length, showing mainly silver-lead ore, and the lower or Jeff Davis tunnel, of circa 1,000' length, cutting a

large body of low grade sulphide ore. In 1908 opened 2 new ledges, on 3′ to 4′ width giving assays of 12% copper, the other being a vein of si lead ore of good average tenor. Mine has about 9,000′ of workings an considered promising.

BINGHAM CENTRAL-STANDARD COPPER CO. UT

Mine office: Bingham Canyon, Salt Lake Co., Utah. Samuel Newh president; D. C. Jackling, vice-president and general manager; Wm. M. B ley, secretary; H. P. Clark, treasurer. Organized 1907, with capitaliza $5,000,000, shares $5 par. Is a holding company, controlling, through ow ship of practically entire stock issues, the Bingham Central Mining Co. the Bingham Standard Copper Co., which are separately described.

BINGHAM-COCHISE COPPER MINING CO. UT

Office and mine: Bingham Canyon, Salt Lake Co., Utah. Elmer Hill, m ager. Organized January, 1906, under laws of Utah, with capitalizat $500,000, shares $1 par. Lands include the Cochise and Brooks claims, in Bingham district. Apparently a stock-jobbing enterprise.

BINGHAM CONSOLIDATED MINING & SMELTING CO. UT

Office: 60 State St., Boston, Mass. Mine office: Bingham Canyon, S Lake Co., Utah. Edward L. White, president; W. S. McCornick, v president; C. E. Davis, secretary; H. N. Sweet, treasurer; Duncan McVic managing director; preceding officers, W. F. Hammond, J. A. Coram, W Freeman, L. T. Trull and O. E. Weller, directors. Organized Apr. 24, 1 under laws of Maine, as a reconstruction of the Bingham Copper & Gold Min Co., with capitalization $10,000,000, shares $50 par. Bonds, $1,000,000 aut ized, at 6%; outstanding, $903,000. Annual meeting, third Wednesday April. Owns an interest of 190,000 shares out of capitalization of 250,00 Eagle & Bluebell Mining Co., and 231,500 shares in the Tesora mine of Tintic district.

Lands, circa 300 acres, in the Bingham or West Mountain district, inc ing the Dalton & Lark, Antelope, Brooklyn, Commercial, Miner's Dr Sampson, Old Hickory, Vernard, Bingham and sundry other mines and cl

In 1907 the company lost, on operations, $277,442.43, ending the with quick assets of $244,697.70 and direct liabilities of $770,186.35, sho that operations were conducted at a loss for some time preceding the break in the copper market. An involuntary petition in bankruptcy filed June, 1908. A reorganization is being effected, under the title of ham Mines Co., and the property formerly held by the Bingham Consoli Mining & Smelting Co. will be found described under latter title. Produ 1906, was 11,475,863 lbs. fine copper, of which amount only 6,124,333 lbs. produced from ore taken from the company's own mines.

BINGHAM COPPER CO. U

Office: Salt Lake City, Utah. Mine office: Bingham Canyon, Salt La Utah. Edw. Home, president; W. E. Hubbard, vice-president; F. E. McG treasurer; Edward McGurrin, secretary. Capitalization $800,000, shares $ Lands, circa 120 acres, lying north of the Utah Apex and west of the B Liberal, having 2 tunnels and 2 shafts on the Venice claim, at the he Cottonwood Gulch, and produced a little high grade ore in early days.

BINGHAM COPPER BOY MINING CO. U

Office: 14 West First South St., Salt Lake City, Utah. Mine office: ham Canyon, Salt Lake Co., Utah. Abram Hanauer, Jr., president; Spalding, vice-president; J. H. Hurd, secretary; J. A. Cook, treasurer general manager; J. B. Taylor, superintendent. Organized Feb. 19, under laws of Utah, with capitalization $1,500,000, shares $1 par. A meeting, first Monday in March.

Lands, 12 claims, 11 patented, area 142 acres, also an 11-acre millsit

k Cañon, in the western part of the Bingham camp, somewhat out veloped district, lying west of the Highland Boy mine of the Utah ted and apparently carrying a continuation of the Utah-Apex ore Property shows 3 veins, of 20′ to 40′ reported width, giving estimated assays of 6% copper, 20% lead, 1.5% zinc, 18 oz. silver and $2.50 ton, these figures being in themselves evidence of gross exaggeration. he dump shows 2 to 4.5% copper. Mine has an 800′ crosscut tunnel 000′ lower tunnel, with circa 6,500′ of workings, claimed by company ,500,000 tons of ore in sight, which figures are excessive. Equipment an electric air-compressor. Company is out of funds and property h poor prospects, though property is not devoid of promise.

AM COPPER GLANCE MINING CO. **UTAH.**

d. Merged, 1907, in Bingham Amalgamated Copper Co. Was suc- f the Copper Glance Mining Co. Formerly at Bingham Canyon, Salt ., Utah.

AM COPPER & GOLD MINING CO. **UTAH.**

ces: 60 State St., Boston, Mass., and 700 McCornick Bldg., Salt Lake ah. Is the parent corporation of the Bingham Consolidated Mining & g Co.

AM-COPPER HILL MINING CO. **UTAH.**

ce: Salt Lake City, Utah. Letter returned unclaimed from former fice, Bingham Canyon, Salt Lake Co., Utah. Henry P. Clark, president; . Bradley, vice-president; Abram Hanauer, Jr., secretary and treasurer; ng officers, C. E. Allen and A. P. Mayberry, directors; G. L. Bemis, manager. Organized Dec. 18, 1905, under laws of Utah, with capital- $1,500,000, shares $5 par. Lands, 5 claims, patented, area 100 acres, as the Copper Hill group, adjoining the Conger and having a 500′ tunnel, number of other short tunnels and shallow shafts.

HAM COPPER MINING CO. **UTAH.**

ed. Succeeded, circa 1906, by Bingham Mary Copper Co. Formerly at m Canyon, Salt Lake Co., Utah.

HAM & EASTERN COPPER MINING CO. **UTAH.**

ed. Reorganized, 1903, as Bingham & Eastern Mines Co. Formerly at m Canyon, Salt Lake Co., Utah.

HAM & EASTERN MINES CO. **UTAH.**

ed. Formerly at Bingham Canyon, Salt Lake Co., Utah. Described IV.

HAM GREAT WESTERN MINING CO. **UTAH.**

ine office: Bingham Canyon, Salt Lake Co., Utah. Organized 1908, to e in the West Mountain district.

HAM GROUP MINING CO. **UTAH.**

ine office: Bingham Canyon, Salt Lake Co., Utah. R. L. Boothe, super- ent. Lands include the Croesus claim and the Greeley-Sacred group, d by tunnel. Idle.

HAM MARY COPPER CO. **UTAH.**

ice: care of Simon Bamberger, president, Salt Lake City, Utah. Mine Bingham Canyon, Salt Lake Co., Utah. W. H. Dickson, vice-president; F. Adams, treasurer; J. B. Bean, secretary; Jas. Start, superintendent. ined 1905, under laws of Utah, with capitalization $2,500,000, shares $5 Register & Transfer Company of Jersey City, transfer agent. Lands, 2 s, patented, area 40 acres, in Carr Fork, near the Utah Apex. Mine has ′ shaft, showing ore assaying 4.7% copper, up to 12 oz. silver and $1 to $3 per ton. Has an electric hoist, good for 1,500′. Has sundry small but ate mine buildings, and a tramway to the Rio Grande Western Railroad.

Has but little ore developed and probably will have to go to consider greater depth to find commercial ore bodies.

BINGHAM MARY MINING CO. U

Dead. Apparently succeeded, circa 1906, by Bingham Mary Copper Formerly at Bingham Canyon, Salt Lake Co., Utah.

BINGHAM METAL MINING CO. U

Offices: 161 Devonshire St., Boston, Mass., and 616 McCornick Bldg., Lake City, Utah. Mine office: Tooele, Tooele Co., Utah. Clarence K. M nick, president; Fred C. Smith, vice-president and general manager; W B. Farmer, treasurer; preceding officers, Cabot J. Morse and H. A. S directors. Organized under laws of Maine. Capitalization, issued, $3,38 Apparently was to have been succeeded, 1907, by Bingham Metals Co., doubtful if change was made. Lands, circa 1,300 acres, in Middle C fairly timbered and having a sawmill. Mine has 5 tunnels, No. 1 being 1 No. 4 being 1,700′, and No. 5 being 500′ in length. It is thought tha cupriferous porphyries of Bingham Canyon may extend to this comp property, development being from the Tooele side. Has water and el power.

BINGHAM METALS CO. U

Office: care of Clarence K. McCornick, president, Salt Lake City, Mine office: Bingham Canyon, Salt Lake Co., Utah. Fred C. Smith, president and general manager. Organized 1907, under laws of Utah, capitalization $5,000,000, shares $5 par. Apparently is related to Bin Metal Mining Co.

BINGHAM MINES CO. U

Office: Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Co., Utah. John Dern, president; C. W. Whiteley, vice-president; Frank treasurer; D. B. Locker, secretary; preceding officers, D. C. Jackling, S Newhouse and H. C. Edwards, directors. Organized 1906, under laws of with capitalization $650,000, shares $1 par. Lands, 13 claims, area circ acres, between the United States and Bingham Metals Mining Co., having tunnel. Has surface ores of low grade. Has no connection with other pany of same name.

BINGHAM MINES CO. U

Office: 60 State St., Boston, Mass. Mine office: Bingham Canyon, Lake Co., Utah. Works office: Murray, Salt Lake Co., Utah. Jas. P. G president. Organized 1908, under laws of Maine, with capitalization $1,50 shares $10 par, as a reconstruction of the Bingham Consolidated Min Smelting Co. Plans a $600,000 second-mortgage collateral 5-year 6% bond issue, convertible into stock at par. Exchanged 1 share new stoc 1 share old stock of Bingham Consolidated, plus $3.50 cash, payable i 50-cent installments. Control of the Bingham Consolidated should carry trol of the Eagle & Blue Bell Mining Co. at Eureka, Juab Co., Utah.

Lands are circa 500 acres, including the Dalton & Lark and Comm mines, on the west side of Bingham Cañon, and the Mascotte mine, these the principal properties, also the Antelope, Brooklyn, Miner's Dream, Sam Old Hickory, Bingham, Vernard and sundry other mines and claims. properties have a considerable variety of ores, principally sulphides, car fair gold and silver-lead values at and near surface, changing at dep auriferous and argentiferous chalcopyrite, of low average grade, estim probably too high, at 2.5% copper, with combined gold and silver valu about $2 per ton. Some of the ores are high in iron, hence desirable for ing, as the ores of the district are highly silicious, as a rule.

The Dalton & Lark mine, area 240 acres, has shafts of 850′ and 1, with 4 tunnels, one having an electric haulage plant, extraction being e sively by tunnel. The Dalton & Lark vein on the 11th level averages abo

width, carrying about 2% copper, 6 oz. silver and $1.50 gold per ton. The Bingham vein, of about 8' width, is said to average 6% copper and $2 to $6 combined gold and silver values, which probably is too high. The lead ores of the Dalton & Lark are richer than the copper ores, as a rule. The mine is claimed to have about 250,000 tons of medium grade and 500,000 tons of low grade ore in sight.

The Commercial mine, area 26 acres, has 2 ore bodies and is perhaps the best mine of the company, being estimated to show reserves of about 500,000 tons of ore averaging about 2% copper and $2.50 per ton in combined gold and silver values, ore having an excess of iron.

The Mascotte mine, area 160 acres, has the Mascotte tunnel of circa 7,000' length, which drains the Dalton & Lark, Brooklyn and Miner's Dream mines, providing extraction also. Cost of tunnel was about $225,000, and it is planned to be driven, eventually, to the Ohio mine, with a total length of circa 8,000'. The Mascotte shows a fair vein of silver-lead ore, and the "Lead Line vein," said to be circa 150' wide, carries an average of 1.25 to 1.50% copper and 6 to 9 oz. silver per ton, with small gold values.

The Brooklyn mine, 1,600' deep, has a 20' vein in the bottom levels, showing a large tonnage of low-grade ore.

The Miner's Dream mine has been drained by the Mascotte tunnel, and can be operated through that tunnel, which taps the ore bodies 600' below the old workings.

The Sampson mine carries auriferous and argentiferous chalcopyrite and auriferous galena.

The mine of the Fortune Mining & Milling Co. at Bingham is held under lease. The Tesora and Eagle & Blue Bell properties are described separately, under the names of the respective companies holding direct title.

The smelter, 13 miles from the mine, blown in 1901, is 150x400' in size, of steel frame on stone foundations, having steel and cement floors and iron sides and roof, the only wood in the structure being the ore-bin partitions. Plant is terraced throughout, permitting handling of material by gravity. Equipment includes five 200-ton water-jacket blast-furnaces, 42x72" at the tuyeres, calcining furnaces, a large reverberatory furnace, and a briquetting plant, capacity of the works being about 1,000 tons daily. Works have both steam and electric power, with a 1,000-h. p. Rarig blowing machine, Stirling boilers and automatic stokers. Smelter has a 375' dust-chamber and a 200' steel smokestack, of 12' diameter. The converter plant has 2 stands, with six 12-ton shells, each 24x126". Owing to trouble from smelter fumes, works were closed down, by injunction, late 1907, this proving the finishing stroke in bankrupting the Bingham Consolidated.

The Bingham Mines Co. has some serious financial and metallurgical problems to work out, but the mines, while low in grade, are by no means devoid of promise.

BINGHAM MONITOR MINING CO. **UTAH.**

Office: care of E. J. Wilkinson, secretary, Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. G. R. Cleaveland, president; Dale Palmer, vice-president. Organized 1906. Lands include the Ruth and Monitor groups. Presumably idle.

BINGHAM NEVADA MINING CO. **NEVADA.**

Office: Bingham Canyon, Utah. Mine office: Goodsprings, Lincoln Co., Nev. R. D. Kennedy, secretary; W. T. Simons, treasurer; J. M. Richards, superintendent. Lands, 10 claims, including the Payday group of 3 claims, said to have a 2' vein of 40% zinc ore, and the Paymaster group of 3 claims.

BINGHAM-NEW HAVEN COPPER & GOLD MINING CO. **UTAH.**

Office: P. O. Box 84, New Haven, Conn. Operating office: 508 McCor-

nick Bldg., Salt Lake City, Utah. Mine office: Bingham Canyon, Salt City, Utah. L. E. Stoddard, president; E. B. Critchlow, vice-president; Farnam, secretary and treasurer; preceding officers, E. G. G. Stoddard a S. Brusler, directors; C. H. Doolittle, general manager; H. J. Turley, superintendent. Organized Oct. 12, 1902, under laws of Utah, with capit tion $2,000,000, shares $5 par; issued, $1,150,000. Bonds, $200,000 autho at 6%; $78,250 issued and $46,000 outstanding, due June 1, 1909. Paid a dividend 1906, and 10% dividend 1907. Annual meeting, second Tuesd October. Union Trust Co., New Haven, registrar.

Lands, 26 claims, area 500 acres, including the Zelnora mine, nea head of Carr Fork, above the Highland Boy mine of the Utah Consolid property showing 3 fault fissures in porphyry and a contact deposit bet quartz-porphyry and limestone. The latter, of 3′ to 8′ width, carries 2 t copper, 10 to 22% lead, 7 to 12% zinc, 2 to 8 oz. silver and 40 to 80 gold per ton, ores being chalcopyrite, galena and sphalerite. Mine is o by tunnels, with a blind shaft starting 900′ from the portal of the l tunnel, there being a vertical distance of 1,200′ between the highest lowest workings. The new lower tunnel, of 1,030′ length, has cut a very fissure vein, giving assays of about 3% copper, 2.3 oz. silver and $2.50 per ton. Terminal at the upper tunnel is to be moved to the lower tunnel mine operated through latter in the future. Mine has about 3 miles of ings, with an aerial tram connecting with loading bins on the Copper railroad, tram having been removed to opposite side of the cañon. Equi includes electric power and air-compressor. Property has produced $500,000 in ore to end of 1906, and is considered promising.

BINGHAM & SALT LAKE MINING CO. U

Dead. Formerly at Bingham Canyon, Salt Lake Co., Utah.

BINGHAM STANDARD COPPER CO. U

Office: Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Co., Utah. Organized 1906, with capitalization $5,000,000, shares $5 p successor of the Standard Copper Co. Is controlled, through stock owne by the Bingham Central-Standard Copper Co. Lands, 320 acres, partly ented, developed by the Saginaw tunnel. Mine is said to have pro $600,000 worth of ore under former management. Property has a consid number of buildings, and shipped some ore, 1907.

BINGHAM WEST DIP TUNNEL CO. U

Office: 1505-277 Broadway, New York, N. Y. Mine office: Tooele, Co., Utah. F. M. Lyman, president; Milando Pratt, secretary; F. M. B treasurer. Capitalization $100,000, shares 1 cent par. Lands, circa 520 unpatented, developed by an 850′ tunnel, planned to be driven 4 miles, fr Tooele side, through the Oquirrh range, to drain the entire West Mo district, develop mineral bodies and provide water for the Tooele lands. nel has cut several small ore bodies. Is not regarded favorably. Idle.

BIO-BIO (CHILE) COPPER SYNDICATE, LTD. CH

Office: 43 London Wall, London, E. C., Eng. J. Sargent, secretary. ganized July 27, 1906, under laws of Great Britain, with capitalization £3 shares £1 par, to acquire copper mines in Chile. Location of property, if unknown.

BISBEE-ARIZONA DEVELOPMENT CO. ARIZO

Office and mine: Bisbee, Cochise Co., Ariz. Moribund. Described Vol.

BISBEE-ARIZONA GOLD & COPPER MINING CO. ARIZO

Dead. Supposedly succeeded, circa 1905, by Bisbee-Arizona Develop Co. Described Vol. V.

E BELLE COPPER CO. **ARIZONA.**
ad. Formerly at Bisbee, Cochise Co., Ariz., and at Wickenburg, Mari-
o., Ariz. Described Vol. V.

E CONSOLIDATED COPPER CO. **ARIZONA.**
ce and mine: Bisbee, Cochise Co., Ariz. W. J. Lewis, president and
manager; Emil Marks, vice-president; F. A. Hess, secretary. Organ-
2, under laws of Arizona, with capitalization $1,000,000, shares $5 par.
21 claims, area circa 400 acres, northwest of the Copper Glance, showing
conglomerate capping over limestone, opened by a 208′ shaft. Has
ower and a 54-h. p. hoist, good for depth of 1,500′. Out of funds and
e years.

COPPER CO. **ARIZONA.**
ter returned unclaimed from former mine office, Bisbee, Cochise Co.,
rganized under laws of Arizona, with capitalization $1,500,000, shares
Company endeavored, September, 1907, to place shares at par, in
claiming lands were near the Copper Queen and Calumet & Arizona,
uch lands have been found. Company also claimed that the manager
opper Queen was president, but this was not true, and apparently none
Copper Queen officials are connected with this company, which, on the
matters, bears the appearance of a swindle.

COPPER DEVELOPMENT CO. **ARIZONA.**
d. Formerly at Bisbee, Cochise Co., Ariz. Described Vol. V.

DULUTH COPPER CO. **ARIZONA.**
ce and mine: Drawer 1196, Bisbee, Cochise Co., Ariz. Christian T.
president; Harris Bennett, vice-president; Walter W. Carley, treas-
L. Williams, secretary; preceding officers, Raymond A. Sauer, Newton
, Carl M. Kolstad and Walter H. Rankin, directors. Organized 1907,
pitalization $900,000, shares $10 par; $4 paid in; issued, $500,000.
27 claims, area 500 acres, including the Corning & Pinyan group of 8
adjoining the Warren Realty & Development Co. Also holds the Cop-
ge group and Red Metal groups. A 70′ shaft on the Little Squaw
f the Corning & Pinyan group shows auriferous and argentiferous
re.

& DULUTH MINING & DEVELOPMENT CO. **ARIZONA.**
e office: Bisbee, Cochise Co., Ariz. Is controlled, through ownership
of stock issue, by Bisbee-Sonora Development Co.

EXTENSION DEVELOPMENT CO. **ARIZONA.**
ce and mine: P. O. Box 829, Bisbee, Cochise Co., Ariz. F. L. Har-
president; John B. Rice, vice-president; Wm. M. Clute, secretary and
manager; J. T. Hood, treasurer; preceding officers, R. C. Starford and
R. Harrington, directors. Organized March, 1907, under laws of Ari-
ith capitalization $400,000, shares $5 par, as successor of the Great
Lands, 25 claims, area 500 acres, in Tombstone Cañon, 8 miles north-
Bisbee, on the porphyry side, showing fissure veins in porphyry carry-
rite, azurite and malachite. Has 5 shafts, deepest 385′, latter said to
in Carboniferous limestone. Equipment includes a 25-h. p. Fairbanks
hoist, good for 800′ depth, with 7 mine buildings. Idle since Septem-
, owing to lack of funds, but plans early resumption. Company hopes
re bodies at depth of about 350′, in the Escobrosa limestone, sup-
correspond with the horizon of the best ore bodies in Bisbee.

GOLD & COPPER MINING CO. **ARIZONA.**
. Succeeded, Dec. 27, 1902, by Bisbee-Arizona Gold & Copper Min-
Formerly at Bisbee, Cochise Co., Ariz.

BISBEE MINING CO. ARI

Dead. Dissolved, 1904, with all debts paid. Formerly at Bisbee, Co., Ariz.

BISBEE QUEEN DEVELOPING CO. ARI

Office: care of E. E. Dennis, president, Grand Rapids, Mich. Mine care of Hoval A. Smith, managing director, Bisbee, Cochise Co., Ariz. ized Apr. 20, 1903, under laws of Arizona, with capitalization $1,0 shares $1 par. Lands, 27 claims, lying between the Portage Lake & and Pittsburg & Heela. Was reorganized, 1905, through purchase, by A. Smith and associates, who are allowing the land to lie idle, pending opments on adjacent properties.

BISBEE-QUINCY COPPER MINING CO. ARI

Dead. Formerly at Bisbee, Cochise Co., Ariz. Described Vol. VI.

BISBEE-SONORA DEVELOPMENT CO. MEXICO & ARI

Office: Douglas, Ariz. Mine office: Paradise, Cochise Co., Ariz. Ames, president. Organized February, 1907, under laws of Arizona, wi italization $2,500,000, shares $2 par, as successor of Paradise Devel Co. Is a holding corporation, controlling, through ownership of 60% o issue each, 5 subsidiary companies, these being the Badger-Hall Mini and Paradise Mining Co. near Paradise; Ohio Mining Co. and Bisbee & Mining & Development Co. near Bisbee, and the Dispatch Mining Co. in ern Sonora. Subsidiary corporations are separately described.

BISBEE & SUPERIOR DEVELOPMENT CO. ARI

Dead. Dissolved, 1904, with all debts paid. Formerly at Bisbee, Co., Ariz.

BISBEE-WEST COPPER MINING CO. ARI

Dead. Formerly at Bisbee, Cochise Co., Ariz. Described Vol. VI.

KUPFERERZ GEWERKSCHAFT BISMARCK. GERM

Office and mine: Hanover, Braunschweig, Germany. Organized N 1899. Property is various copper and iron mines, former including th genrothe in Brunswick, and the Rothbart in Prussia, carrying malachi other copper ores, the iron ore mines being near Ruhla, Saxe-Weimar.

BISMARCK-NUGGET GULCH CONSOLIDATED MINING CO. MON

Dead. Bankrupt and property sold by sheriff, 1905. Apparently w ceeded, 1907, by Bismark Copper Co., which in turn was succeeded by tana-Illinois Copper Mining Co. Formerly at Brandon, Madison Co., M

BISMARK COPPER CO. MON

Dead. Succeeded the Bismarck-Nugget Gulch Consolidated Minin and was succeeded, circa 1907, by Montana-Illinois Copper Mining Co. merly at Brandon, Madison Co., Mont.

BISMARK COPPER MINING CO.

Letter returned unclaimed from former office, Butte, Mont. Organiz 24, 1905, under laws of South Dakota, with capitalization $500,000, sha par, by J. R. Sievers, Alexander Mackey, J. W. Mahoney, B. W. Wilson Kerr and Mathew W. Murphy. Location of lands, if any, unknown.

BISON MOUNTAIN MINING CO. MON

Mine office: Elliston, Powell Co., Mont. Ores carry gold, silver, and lead. Has steam power. Idle.

BITTER MOUNTAIN MINING CO.

Dead. Started as a copper mining company, but found no copper.

BITTER ROOT COPPER MINING CO. MON

Dead. Lost its lands, circa 1904, through inability to meet bond pay Formerly at Saltese, Missoula Co., Mont.

BLACK BAY MINING CO. **ONTARIO.**

Office: Willmar, Minn. G. P. Carwand, president; N. B. Carlson, secretary. Organized Nov. 5, 1901, under laws of Arizona, with capitalization $1,000,000. Lands, 3 crown-granted claims, area 266 acres, also 13 acres miscellaneous lands, all heavily timbered, on Black Bay, in the Thunder Bay district of Ontario. Country rock is trap, showing 7 cupriferous amygdaloidal beds, claimed by company to average 2% native copper, 1.25 oz. silver and $2 gold per ton. Idle for several years.

BLACK BEAUTY COPPER CO. **CALIFORNIA.**

Office: Los Angeles, Cal. Mine office: Cima, San Bernardino Co., Cal. W. B. Chapman, superintendent. Lands, 19 claims, on the southern side of Black Mountain, circa 25 miles north of Cima, said to show a mineralized zone of 100' to 400' width, traceable 8,000', opened by 8 pits and shafts of 15' to 40' depth, on veins of 1' to 4' width, showing malaconite and malachite.

BLACKBIRD COPPER & GOLD MINING CO. **IDAHO & UTAH.**

Office: 745 Ellicott Sq., Buffalo, N. Y. Mine offices: Newhouse, Beaver Co., Utah, and Salmon, Lemhi Co., Idaho. John E. DuBois, president; Chas. I. North, vice-president; L. A. Amsden, secretary and treasurer; Dr. P. A. H. Franklin, manager; Geo. S. Fitzwater, superintendent in Idaho; Peter M. McPhee, superintendent in Utah. Capitalization, $2,000,000; bonded debt, $500,000; indebtedness, 1907, was $745,379.

Lands are 33 patented claims, area 482 acres, in the Blackbird district of Lemhi county, Idaho, from which small smelter shipments have returned 3% copper and circa $8 gold per ton.

Utah lands are 84 patented claims, area 1,437 acres, adjoining the Cactus mine of the Newhouse Mines & Smelters, on which a large shaft was started, some years ago. Considerable development has been secured, only compulsory assessment work has been done since 1903. Property is considered promising.

BLACK BIRD MINING CO. **MONTANA.**

Office and mine: Butte, Silver Bow Co., Mont. Frank H. Cooney, manager. Is a leasing company, operating ground leased from the East Butte Extension Mining Co., and is composed mainly of officers of latter.

BLACK BUTTE MINING & REDUCTION CO. **ARIZONA.**

Office: Phoenix, Ariz. Letter returned unclaimed from former mine office, Big Springs, Yavapai Co., Ariz. T. Connell, president and treasurer; M. Thompson, secretary; J. C. Dobbins, general manager. Organized under laws of Arizona, with capitalization $750,000, shares $1 par. Lands, 5 claims, area 100 acres, in the Castle Creek district, 26 miles from Santa Fé, Prescott & Phoenix railway, showing 3 fissure veins in shale averaging 8' width, carrying cuprite, azurite, malachite, chalcocite and atacamite, opened by a 220' tunnel and 170' shaft. Has steam power and necessary mine buildings. Development as yet is within the leached zone, atacamite being the predominant ore, occurring in a paystreak of 12" to 18" along the footwall and giving average assays of 34% copper. Idle.

BLACK CANYON COPPER CO., LTD. **ARIZONA.**

Dead. Was a bad outfit. Lands sold to Copper Canyon Mining Co.

BLACK COPPER CO. **NEW MEXICO.**

Mine office: Elizabethtown, Colfax Co., N. M. Is a gold producer only.

BLACK DIAMOND COPPER MINING CO. **ARIZONA.**

Office: care of E. D. Kennedy, treasurer and general manager, Warren, Ariz. Mine office: Pearce, Cochise Co., Ariz. J. G. Hearne, president; H. C. Christie, vice-president; Dr. T. M. Sabin, secretary; W. G. Barney, superintendent; F. H. Mitchell, smelter superintendent. Organized 1898, under laws

of West Virginia, with capitalization $2,000,000, shares $5 par. Bon
$480,000.

Lands, 35 claims, area circa 500 acres, 6 miles from Pearce, in the Coch
Mountains. Ores occur as contact deposits between limestone and porphy
with parallel dykes of sandstone and quartzite, having a heavy gossan c
ping, in places 150′ wide. Ores are almost exclusively sulphide, being mai
chalcopyrite and bornite, with iron and silica gangue, estimated to aver
better than 6% copper, 10 oz. silver and $1.40 gold per ton, with about 3
silica. Property was opened originally for silver. Development is by a 1
shaft and 4 tunnels, lowest 600′ below crest of the hill, tunnels being c
nected by winzes. Mine is connected with smelter by a 1½-mile Leschen ae
tramway, having a drop of 800′, with 600 tons daily capacity. Has a pum
ing plant with 4″ pipeline, installed at Pearce, this having capacity to ra
100,000 gallons daily against a head of 804′ in 6 miles, with a 350,000-gal
storage reservoir at the mine. Property has a good steam equipment, includi
2 air-compressors with 15-drill capacity, petroleum being used for fuel. M
cellaneous improvements include a 20-room hotel, store, schoolhouse and
considerable number of dwellings.

A 200-ton smelter, built 1902, has a 44x120″ Allis-Chalmers rectangu
water-jacket blast-furnace, a 38″ auxiliary cupola and a 24x36′ circular roast
and made a matte carrying about 65% copper, and 150 oz. to 300 oz. silver
ton, with small gold values. Ores are self-fluxing, and easily smelted, a
furnace is claimed to have shown slag losses of only 0.3% copper. Compa
came to grief financially, and was practically reorganized and managem
changed. Work was resumed in fall of 1905. Smelter was blown in 1906
was idle 1907. Apparently the large ore bodies claimed cannot feed a smel

BLACK DIAMOND MINING & DEVELOPMENT CO. WYOMI

Dead. Said to have been liquidated circa 1905.

BLACK DIAMOND TUNNEL CO. BRITISH COLUMB

Office: 604 Land Title Bldg., Philadelphia, Pa. Mine office: Ainswo
Kootenay district, B. C. Maxwell Stevenson, president; Henry M. Steven
secretary. The Highlander tunnel, having a total length of about 3,000′,
cut three veins of 4′ to 13′ width, giving fair assays in silver, lead, copper a
gold. Although the officers of the company were claimed to stand well loca
the company was a mere stock-jobbing scheme. Moribund.

BLACK EAGLE MINING CO. WASHINGTO

Mine office: Chewelah, Stevens Co., Wash. G. A. Mowatt, manag
Lands, 160 acres, 2 miles west of Chewelah, having a 300′ tunnel show
copper ore and free gold.

BLACK EAGLE MINING & MILLING CO. OREGO

Office and mine: Gates, Marion Co., Ore. R. F. Shier, president a
manager; H. F. Gerspach, vice-president; S. C. Sorensen, secretary, treasu
and superintendent; preceding officers, D. C. Smith and L. P. Larsen, directo
W. L. Shier, mine superintendent. Organized 1907, under laws of Oreg
with capitalization $1,000,000, shares $1 par. Annual meeting, first Mond
in February. Lands, 8 claims, area 160 acres, also 40 acres miscellane
lands, well watered and timbered, 14 miles from Gates, in the Gold Cr
district, on Horn Creek, a tributary of the Little North Fork river, which
a tributary of the Santiam river. Property shows a wide contact vein
tween greenstone and dolomite, traceable circa 1 mile, opened by a 100′ sh
and by several short tunnels, longest 250′, with 500′ of workings, showing
idized ores, mainly malachite, averaging about 10% copper and 6 to 22
silver per ton. Has a hoist and 4 mine buildings. Company plans contin
development and probably will plat a townsite.

FOOT COPPER CO. MONTANA.
d. Succeeded, 1901, by Imperial Montana Copper Mining, Smelting
Power Co. Apparently should have been called the Blackleg instead
Blackfoot. Formerly at Blackfoot, Teton Co., Mont.

FOOT MINING & MILLING CO. WYOMING.
d. Formerly at Battle, Carbon Co., Wyo.

HAWK MINE. ARIZONA.
ned by Arizona Commercial Copper Co.

HILLS CONSOLIDATED COPPER CO. SOUTH DAKOTA.
e office: Keystone, Pennington Co., S. D. Lands, in the Pactola dis-
ave a 118′ shaft.

HILLS COPPER CO. SOUTH DAKOTA.
ce: Benton Harbor, Mich. Mine office: Rochford, Pennington Co., S. D.
. Barnes, president; George M. Thresher, secretary; John Robinson,
r. Organized June 2, 1900, under laws of South Dakota, with capital-
$2,000,000, shares $1 par. Lands, 27 claims, area 510 acres, in the Horn-
district, showing fissure veins in slate, with heavy gossan capping,
carbonate and oxide ores. Ore body under development is said by
to average 20′ width, and to be more than a mile in length, opened
ine shafts of 800′, 40′ and 75′, with crosscut tunnels of 65′ and 300′,
a total of about 1,200′ of underground openings. Ores average 1.5 to
per, with small values in gold, silver and nickel, and a carload shipment
onate ore gave smelter returns of 16.31% copper. Has steam power,
-h. p. hoist, good for 1,500′, and 4 power drills. Idle several years.

HILLS COPPER CO., LTD. ARIZONA.
ice: 232 Fifth Ave., Pittsburg, Pa. Mine office: Jerome, Yavapai Co.,
R. A. Thomas, president; Peter Boyd, vice-president; F. J. LeMoyne,
y and treasurer. Organized July, 1899, and reorganized May 20, 1901,
laws of Arizona, with capitalization $3,000,000, shares $1 par. Union
Co., Pittsburg, registrar; Colonial Trust Co., Pittsburg, transfer agent.
ds, 15 claims, 6 patented, area 280 acres, in the Verde district, between
ited Verde and Equator mines, opened by shafts of 212′ and 550′, with
of 60′ and 90′, with about 2,500′ of openings. Main shaft, at 382′, cut
er of ore assaying up to 13% copper and 3 oz. silver. Has a 280-h. p.
plant, with 125-h. p. tubular high-pressure boiler, duplex pump, hoist
er drills. Resumed work August, 1905; suspended 2 years later. Said
n debt.

HILLS & DULUTH COPPER MINING CO. SOUTH DAKOTA.
e office: Custer, Custer Co., S. D. F. A. Towner, president; M. J.
secretary; W. F. Hanley, treasurer; W. A. Nelson, superintendent.
ization $3,000,000, shares $1 par. Lands, 340 acres, 8 miles northwest
ter, adjoining the Central Black Hills Copper Co., showing promising
of argentiferous and auriferous copper ores assaying up to 20%
slightly developed by 2 shafts. Has water power. Idle for several

HILLS GOLD & COPPER MINING CO. ARIZONA.
e and mine: care of R. H. Burmister, general manager, Prescott,
Co., Ariz. Apparently moribund.

JACK CONSOLIDATED MINING CO. UTAH.
e: Provo, Utah. Letter returned unclaimed from former mine office,
City, Summit Co., Utah. Jesse Knight, president; J. Wm. Knight, vice-
t; E. E. Allen, secretary and treasurer; preceding officers, W. Lester
n and Amanda M. Knight, directors. Organized 1907, under laws of
with capitalization $100,000, shares 10 cents par, as a merger of the
Jack Mining Co. and Star Consolidated Mining Co. Mine has consider-

able development, showing horn silver and ore up to 6% in copper tenor, value as developed being mainly in silver.

BLACK JACK COPPER CO. CALIFORNIA

Letter returned unclaimed from former mine office, Greenwater, Inyo Co. Cal. T. J. McDonald, superintendent. Was sinking two shafts, showing copper ore, with a force of 8 men in the spring of 1907. Idle.

BLACK JACK COPPER MINING CO. MONTANA

Office: care of Martin Mulvahill, Helena, Mont. Mine office: Clancy, Jefferson Co., Mont. Organized circa June, 1907, with capitalization $400,000, to develop sundry copper claims in the Corbin district.

BLACK JACK MINING CO. UTAH

Dead. Merged, 1907, in Black Jack Consolidated Mining Co. Former at Park City, Summit Co., Utah.

BLACK PEAK GOLD & COPPER MINING CO. NEW MEXICO

Dead. Formerly at Engel, Sierra Co., N. M.

BLACK PRINCE COPPER CO. ARIZONA

Office: 635 Symes Bldg., Denver, Colo. Mine office: Johnson, Cochise Co., Ariz. Robt. N. Bell, president; Dr. John C. Thompson, vice-president and general manager; J. B. Wright, secretary and treasurer; preceding officers Robt. Temple and Hon. D. S. Tullar, directors; Richard Harris, superintendent; N. E. Boggs, mine superintendent. Organized May 10, 1901, under laws of Arizona, with capitalization $1,500,000, shares $1 par; issued, $1,046,000. Annual meeting, last Wednesday in May.

Lands, 8 claims, patented, area 147 acres, showing contact deposits of limestone, near a porphyry contact. Mine has a 233′ shaft, with circa 2,000′ of workings, showing oxides, carbonates, bornite and chalcopyrite. Four car-loads of ore shipped to El Paso smelter gave returns of 12% copper and 20 to 30 oz. silver per ton. Has a 15-h. p. hoist and 3 mine buildings. Company free from debt and plans steady development.

BLACK PRINCE COPPER MINING CO. IDAHO

Office: Fairmont, West. Va. Mine office: Coeur d'Alene, Kootenai Co., Idaho. Capitalization $3,000,000. Lands, 8 claims, circa 20 miles above head of navigation on the St. Joe river, showing auriferous copper ore.

BLACK RANGE COPPER MINING CO. NEW MEXICO

Office and mine: Fairview, Sierra Co., N. M. B. S. Phillips, general manager; preceding officer, F. E. Green, L. H. Armstrong, E. D. Thayer and Glad Allen, directors. Organized January, 1906, with capitalization $1,250,000, shares $1 par. Idle and apparently has done no work.

BLACK ROCK COPPER CO. UTAH

Mine office: Frisco, Beaver Co., Utah. Lands are sundry claims in the Beaver Lake district of Beaver county, Utah, on which work, begun 1904, has shown ore assaying up to 36% copper, with small gold and silver values.

BLACK ROCK GOLD & COPPER MINING CO. ARIZONA

Dead. Formerly at Jerome, Yavapai Co., Ariz. Fully described Vol. V.

BLACK ROCK MINING CO. ARIZONA

Office: care of R. C. Vincent, president and manager, Superior, Wis. Mine office: Wickenburg, Maricopa Co., Ariz. Lands, 9 claims, area 180 acres, in the Bradshaw Mountains, 17 miles from rail connection at Wickenburg. Country rocks are granite and syenite, showing 4 fissure veins, averaging about 30″ width, carrying copper, lead, gold and silver, with quartz gangue, and also showing porphyritic dykes carrying low-grade ores. Development is by several shallow shafts and short tunnels. Has gasoline power. Idle and apparently moribund.

BLACK ROCK MINE. MONTANA

Owned by Butte & Superior Copper Co.

LACK ROCK MINING CO. **MONTANA.**
Dead. Lost leased lands. Formerly at Butte, Silver Bow Co., Mont.

LACK TIGER COPPER MINING CO. **WYOMING.**
Dead. Property lost Jan. 1, 1905. Formerly at Encampment, Carbon Co., Wyo.

LACK TRAVELER COPPER MINING CO. **MONTANA.**
Office: Mullan, Idaho. Mine office: Saltese, Missoula Co., Mont. Jas. ...sers, manager. Lands, 6 claims, 7 miles northeast of Saltese, showing a ... of about 6' width, carrying 8% copper ore. Has a 560' tunnel, planned ... be driven circa 1,400', on Black Traveler lands, to run into the property of ... Marie Mining Co. Property shows some ore of 12 to 14% copper tenor ... shallow workings.

LACK WARRIOR COPPER COMPANY, AMALGAMATED. **ARIZONA.**
Dead. Reorganized, 1905, as Warrior Copper Co. Formerly at Black ...rrior, Gila Co., Ariz.

LAKE MINING, MILLING & INVESTMENT CO. **NEW MEXICO.**
Office and mine: Las Vegas, Lincoln Co., N. M. Mill office: Chapelle, San ...el Co., N. M. H. E. Blake, president and general manager; S. B. Davis, ... vice-president; B. C. Pittenger, secretary; C. P. Hammond, treasurer; pre... officers and Jos. L. Matt, directors. Capitalization $200,000. Lands, ... acres, in the Mineral Hill district, circa 12 miles from Las Vegas, slightly ...loped by shafts and tunnels. A 14-ton sample ore shipment yielded 2.1% ...per. The reduction plant, 7 miles from the mine, doing a general custom ..., includes a mill and 50-ton Gardiner process leaching plant.

LANCA COPPER MINING CO. **NEW MEXICO.**
Office: 514 Cooper Bldg., Denver, Colo. Letter returned unclaimed from ... mine office, Silver City, Grant Co., N. M. Henry Izard, president; ... E. Hannen, vice-president; E. Sanders, secretary. Lands, 3 claims, area 60 ..., in the Bear Mountain district, 8 miles from Silver City, claimed to ... old workings, and said to be reopening by a tunnel claimed to show ...iferous and argentiferous copper ore of good assay value. This is one of ... promotions of the Financial Security & Trust Co., of Denver, and prob... is absolutely fraudulent, as this same company was the promoter of the ...ish Lost Bullion Mines, Geronimo Copper Mining Co. and Pizarro Copper ...ing Co., all of which claimed to have old Spanish workings. The Spanish ... Bullion was proven in court to be an outright swindle, and presumably ... promotions of the company are no better.

OMPAÑIA MINERA BLANCA TORRE DE COLLAHUASI. **CHILE.**
Office: Varparaiso, Chile. Mine office: Collahuasi, Tarapacá, Chile. Or...ized June 23, 1906, under laws of Chile, with capitalization £120,000, shares ... par.

LANCHE COPPER MINING CO. **WYOMING.**
Office: 432 Omaha National Bank Bldg., Omaha, Neb. Mine office: En...ampment, Carbon Co., Wyo. H. E. Owen, president; Jas. H. Kyner, secre...y; Arthur H. Crow, general manager. Organized Apr. 2, 1902, under laws ... Wyoming, with capitalization $1,000,000, shares $1 par. Lands, 5 claims, ...r the New Rambler, showing 2 veins, one of which, 3' to 5' wide, is claimed ... show auriferous oxide, carbonate and sulphide ores in a 160' shaft. Idle ...eral years.

...ND MINE. **ARIZONA.**
Office: Patagonia, Santa Cruz Co., Ariz. Wm. T. Powers, owner and man... Mine has a 500' tunnel, with about 2,000' of workings, showing a main ... and 2 blind ledges, carrying mainly copper, with some silver-lead.

...NEY COPPER MINES & SMELTERS, LTD. **AUSTRALIA.**
Mine and works office: Blayney, Bathurst Co., N. S. W., Australia. S.

Remfry, manager. Organized 1906, under laws of New South Wal capitalization £25,000. Plans doubling capitalization to complete Lands, sundry freehold claims include the mine variously known as t ney, Great Blayney and Annandale, reopened 1897, having a 390′ shaft ing a 40′ vein carrying chalcopyrite disseminated in andesite. Has smelter with water-jacket blast furnace, large reverberatory furn Edwards calciner, doing a general custom business. Machinery and were thoroughly overhauled and mine reopened, 1907, and smelter b 1908. Production of mine, 1901, was 418 long tons of copper from 18, of ore smelted.

BLAYNEY MINING & SMELTING CO. AUST

Dead. Succeeded, 1906, by Blayney Copper Mines & Smelters, Lt merly at Blayney, N. S. W., Australia. Described Vol. VI.

BLEW BUR COPPER CO. CALIF

Office: 25 Broad St., New York, N. Y. Andrew F. Burleigh, presid treasurer; Edw. Blewett, vice-president; M. E. Milles, secretary; B Blewett, general manager. Organized October, 1906, under laws of with capitalization $30,000,000, shares $100 par. Lands, 120 claims, ar acres, in the Ironwood district of Riverside county, California, on Mc Palen Mountains, circa 65 miles north of Salton. Company claims about 45 different veins on its lands, of which 1 is reported as 6′ to width, opened by 4 shafts of 30′ to 52′ depth, carrying cuprite, malachite, chalcocite and chalcopyrite, estimated by company to avera copper, 7 oz. silver and $18 gold per ton. Company estimates 1,000,(of ore in sight, which is entirely too high. Transportation facilities a but the Arizona & California railroad should reach vicinity of the 1909. A sample carload of selected ore, weighing 29,000 lbs., shippe to El Paso, netted $1,382.

BLINMAN COPPER MINING CO. AUST

Dead. Property sold, 1902, to Tasmanian Copper Co., Ltd.

BLOODY ROSE COPPER CO. AR

Mine office: Tucson, Pima Co., Ariz. Chas. F. Hoff, president and manager. Capitalization $3,000,000, shares $1 par. Lands, 5 claims, a acres, 3 miles west of Tucson, near the Old Pueblo mine, in the Amole practically undeveloped but showing good surface indications.

BLUE ACRE COPPER CO.

Office: 409 Dooly Blk., Salt Lake City, Utah. Letter returned un from former mine office, Blue Acre, Beaver Co., Utah. Henry M. C president and general manager; Wallace W. Wait, vice-president, secret treasurer. Capitalization $600,000, shares $1 par. Lands, 17 claims, a acres, in the Beaver Lake district, showing 5 contact and fissure v which three, of good average width, are being developed, these carryin estimated by management at 6% copper, 5 oz. silver and $4 gold per to oxide, carbonate and sulphide ores, opened by 4 shallow shafts. I regarded as promising, though but slightly developed, but company ap very feeble.

BLUE BELL-BELCHER MINING CO. WASHI

Office: care of C. E. Mitchell, Spokane, Wash. Mine office: R Ferry Co., Wash. Wm. Woodward, superintendent. Organized 1906 laws of Washington, with capitalization $1,500,000, shares $1 par. sundry claims, known as the Blue Bell group, carrying 3,000′ of the no extension of the Belcher vein. Development is by tunnel, showing cupriferous gold ore.

ELL COPPER MINING CO.
ce: 36 Swiss St., Cleveland, Ohio. West Virginia charter forfeited
loribund.

ELL COPPER MINING SYNDICATE, LTD. **AUSTRALIA.**
ce: Queen St., Brisbane, Australia. Mine office: Gympie, Queensland,
a. Organized Sept. 18, 1906, under laws of Queensland, with capital-
£60,000, shares £1 par. In liquidation, early 1908. Lands are 13 miles
f Gympie, on the southern branch of Ammon creek. Property has a
ft, opening a 2' vein with 2 parallel veins about 300' distant. Has
some ore returning 15 to 28% copper and 19 to 31 oz. silver per
.

BELL MINING CO. **CALIFORNIA.**
ce and mine: care of J. J. Sullivan, superintendent, Quincy, Plumas
. Lands, sundry claims near Hosslekuss's. Idle for several years.

BIRD CO., LTD. **MONTANA.**
ter returned unclaimed from former mine office, Butte, Silver Bow Co.,
Fred J. Rowlands, manager. Lands, sundry claims three miles west of
Formerly was operated as a gold mine, and once had a 90-stamp mill.
haft 500'. Idle for some years.

BIRD COPPER-GOLD MINING CO. **UTAH.**
d. Succeeded, circa 1907, by New York & Utah Gold & Copper Mining
g Co. Formerly at Milford, Beaver Co., Utah. Described Vol. VI.

BIRD MINING & SMELTING CO. **WASHINGTON.**
e office: Darrington, Snohomish Co., Wash. Idle.

CAP MINING & MILLING CO. **WYOMING.**
e and mine: Casper, Natrona Co., Wyo. Theo. Becker, president;
Mitchie, vice-president; E. Percy Palmer, secretary and treasurer; Wm.
, superintendent. Capitalization $5,000,000, shares $1 par. Lands, in
er Mountains, are opened by a shaft, from which rich copper specimens
en secured.

CREEK COPPER MINING CO. **WASHINGTON.**
d. Formerly in Stevens county, Washington. Described Vol. III.

JACKET CONSOLIDATED COPPER CO. **IDAHO.**
e: 20 Broad St., New York. Letter returned unclaimed from former
ice, Decorah, Washington Co., Idaho. Lands, 295 acres, opened by a
ft. Is said to have produced $200,000 in copper, with smelter returns
% copper. Property was bonded to Col. Geo. W. E. Dorsey, who failed
his men, and came to grief. Idle.

JACKET MINE. **IDAHO.**
e office: Grangeville, Idaho Co., Idaho. Lands, 4 unpatented claims,
acres, showing 2 contact veins, of good width, assaying 4% copper, 7
r and $4 gold per ton. Ores are oxides near surface and sulphides at
Shafts, 100' to 300' deep, with 1,000' of underground workings. Has
power.

JAY EXTENSION MINING CO. **UTAH.**
e: 308 Templeton Bldg., Salt Lake City, Utah. R. E. Fowler, presi-
. H. Gray, secretary and treasurer. Capitalization $500,000, shares $1
Lands, sundry claims in the Washington district of Beaver county, Utah,
developed. Presumably idle.

JAY MINE. **MONTANA.**
ed by Butte & Boston Consolidated Mining Co.

JAY MINE. **NEVADA.**
e office: Yerington, Lyon Co., Nev. A. Pugh, superintendent, at last
n. Is slightly developed by shaft and tunnel. Has steam power.

BLUE JAY MINING CO. CALIFORN

Mine office: Letcher, Fresno Co., Cal. Idle for several years.

BLUE JIM MINING CO. WASHINGTO

Office: Spokane, Wash. Mine office: Ione, Stevens Co., Wash. Lan on the Pend d'Oreille river, near Ione, are said to show a 10′ copper vein.

BLUE LAKE GOLD & COPPER MINING, SMELTING & POWER CO. WASHINGTO

Office: 302-82 Wisconsin St., Milwaukee, Wis. Letter returned unclaim from former mine office, Conconully, Okanogan Co., Wash. C. T. McElroy, s retary and general manager. Organized circa 1902, with capitalizat $3,000,000, shares $1 par. Claims to have 6 veins, of 1′ to 3′ width, giving says of 3 to 49% copper and $3 to $11 gold per ton. Lied atrociously in prospectus. Moribund.

BLUE LEDGE COPPER CO. CALIFORN

Dead. Succeeded, circa 1907, by Blue Ledge Mining Co. Formerly Hutton, Siskiyou Co., Cal.

BLUE LEDGE MINING CO. CALIFORN

Office: 82 Beaver St., New York, N. Y. Mine office: Hutton, Siski Co., Cal. Robert S. Towne, general manager; Frank H. Carnahan, general perintendent. Lands, 24 claims, area circa 440 acres, well timbered, at head of Joe Creek, circa 4 miles south of the Oregon line; also a large smel site on Applegate River, at Seattle Bar.

Claims were located 1889, and more or less work of a desultory na was done before coming under management of present owners. Mine about one-half mile of workings, mainly tunnels, with a considerable am of ore blocked out, and about 7,000′ of diamond drilling, showing various bodies giving average assays of about 5% copper, 2.5 oz. silver and $2.50 per ton. Country rock is mica-schist, showing a contact vein, between b and white schists, traceable circa 8,000′ by a prominent outcrop of 5′ to width. Ore is mainly chalcopyrite, with a little native copper. Has a hy electric power plant, taking water from Elliot Creek with a head of about and has a good machinery equipment. Has built a town, with waterwo sewers and schoolhouse, and has constructed a good road between Hutton Yreka. Property considered promising and management good.

BLUE LIGHT MINING CO. NEVA

Office: 410 Traction Bldg., Indianapolis, Ind. Mine office: Mina, meralda Co., Nev. Paul E. Stormes, president; David S. Swain, vice-presid A. C. Kynett, secretary; W. C. Osborne, treasurer. Capitalization 2,000 shares, presumably $1 par. Has authorized a $125,000 bond issue. Lands claims, 12 miles from Mina, in the Gold Mountain district, having a 300′ compartment shaft showing a vein giving average assays of about 7% per, with small gold and silver values, with an 18″ paystreak assaying 1 42% copper. Claims to have 85,000 tons of ore developed. Has a 45-h gasoline hoist. Five carloads of ore, shipped circa 1907, gave returns of to 23.2% copper, with small gold and silver values.

BLUE MOUNTAIN COPPER MINING CO. COLORA

Dead. Lands sold, circa 1906, to Michigan & Colorado Mining & Milling

BLUE POINT COPPER MINING & MILLING CO. UT

Office: care of E. J. Raddatz, president, Salt Lake City, Utah. John zier, vice-president; F. M. Davis, secretary and treasurer; preceding offic Fred Hodges, Wm. Hanson, W. R. Warren and R. C. Hill, directors. Or ized August, 1906, under laws of Utah, with capitalization $100,000, sh 10 cents par. Lands, 9 claims, in the Bradshaw district of Beaver cou Utah.

BLUE RIDGE COPPER CO., INC. **VIRGINIA.**

Office: 613-145 La Salle St., Chicago, Ills. Mine office: Stanley, Madison Co., Va. Jacob Lauth, president; Frank L. Race, secretary and treasurer; Geo. F. Brigham, Jr., general manager. Organized Apr. 2, 1904, under laws of Virginia, with capitalization $500,000, shares $5 par. Lands, circa 100 acres, on the eastern slope of the Blue Ridge Mountains, opened by old pits and a 200′ shaft, with about 500′ of workings. Ore is variously reported as a contact vein between granite and metamorphosed slate, and as an 8′ bed of greenstone, carrying native copper, cuprite, malachite and azurite. Has a 4′ Pelton wheel, using water under a head of 500′, generating circa 350 h. p. Has necessary mine buildings and a 50-ton Nissen mill.

BLUE RIDGE COPPER MINING CO. **NORTH CAROLINA.**

Dead. Formerly at Gap Creek, Ashe Co., N. C.

BLUE RIDGE REAL ESTATE & DEVELOPMENT CO. **MARYLAND.**

Office: care of I. N. Snively, president, Waynesboro, Pa. John C. Entrikin, vice-president; Eric Krell, secretary and treasurer; preceding officers, Geo. P. School, Saml. Musser and Gideon Sibley, directors. Organized 1906, to develop a copper property on South Mountain, in Garrett county, Maryland.

BLUE STAR MINING CO. **WASHINGTON.**

Mine office: Chewelah, Stevens Co., Wash. Mark Mitchell, manager. Lands, 6 claims, 3 miles from Chewelah, including the Eagle group of 4 claims, formerly owned by Eagle Consolidated Gold Mining & Milling Co. Development is by a 2-compartment 240′ shaft, and an 800′ tunnel, showing a 4′ vein of silver-lead ore, said to parallel the copper vein of the United Copper Co. at a distance of circa 400′. Idle for several years.

BLUESTONE EXTENSION GOLD & COPPER MINING CO. **NEVADA.**

Mine office: Yerington, Lyon Co., Nev. Organized 1906, to develop copper property in the vicinity of Yerington. Presumably idle.

BLUESTONE MINE. **NEVADA.**

Office: 43 Exchange Place, New York, N. Y. Mine office: Yerington, Lyon Co., Nev. Capt. J. R. De La Mar, owner; Chas. A. Weck, superintendent. Lands, 20 claims, 3 miles south of Yerington. Mine has about 6,500′ of workings, including a 1,200′ main haulage tunnel cutting an ore chute about 30′ wide and 500′ long at a point 300′ below the apex, carrying an 80′ pay-streak of high grade sulphide ore said to range up to 20% in tenor, balance of ore being about 3% in copper tenor. Management estimates 1,600,000 tons of ore in sight, averaging 2.6% copper. Ore is mainly chalcopyrite, associated with considerable epidote, in a limestone gangue, there being practically no oxidized ores, even at the outcrop. Ore is garnetiferous, and uniform in character, and adapted to magnetic separation, the epidote gangue, which is nearly as heavy as chalcopyrite, causing difficulty in ordinary wet concentration. Equipment includes a 50-h. p. hoist and a 35-drill electric air-compressor.

The 100-ton mill pulverizes the ore in rolls to pass an 8-mesh screen, after which ore is slightly roasted in a tower-roaster, to magnetize the pyrite. The roasted ore is then passed through a Wetherill magnetic separator, which takes out the mineral and discharges the waste, giving a concentrate of about 15% estimated copper tenor. Magnetic separation is claimed to have given a 95% extraction, though 85% under working conditions should be satisfactory.

The smelter, installed 1901, has a 150-ton water-jacket blast-furnace, but antiquated in design, and of small value. Mine employs circa 25 men. Management is thoroughly experienced and property is considered valuable.

BLUE VEIN COPPER MINING CO. **MONTANA.**

Letter returned unclaimed from former office and mine, Butte, Silver Bow Co., Mont. Organized June 21, 1906, under laws of Montana, with capitaliza-

tion $1,000,000, shares $1 par, by F. L. Melcher, W. F. Noyes and ot
Lands include the Soon placer claim, Valentine and Little Boulder lode cl
and a half interest in the Columbia lode claim.

BLUE WING COPPER CO. NORTH CAROL

Dead. Was succeeded by Boston & Carolina Copper Mining Co. Form
at Baker City, Granville Co., N. C.

BLUE WING MINE. NORTH CAROL

Mine office: Baker City, Granville Co., N. C. Was owned formerly
Blue Wing Copper Co., and later by Boston & Carolina Copper Co., but n
successful, perhaps owing to poor management. Vein is narrow and
chutes uncertain. Ore is highly silicious, and difficult of treatment wit
admixture of basic ores, which apparently are unobtainable in the dis
Mine has several shafts of 100′ to 317′ depth, with 4 levels opened, sho
considerable bodies of disseminated bornite having quartz and calcite ga
Idle some years.

BLUFFTON GOLD & COPPER MINING & SMELTING CO. WASHING

Mine office: Chesaw, Okanogan Co., Wash. Lands, at Bolster, 4
from Chesaw, are said to show ore assaying $18 per ton in combined c
and gold values. Has a 218′ tunnel, planned to be driven 1,200′, and se
shallow shafts.

GEWERKSCHAFT BOBERTHALER ERZBERGWERK. GERM

Mine office: Kupferberg, Schlesien, Germany. Max Arendt, chai
Dr. Bernhard Kossman, general manager. Organized Apr. 20, 1902, under
of Prussia, with capitalization 1,000 shares, of no stated value. Land
hectares, showing country rock of Archean schists, with about 30 ore b
including fissure veins in amphibolite and diorite, and contact deposi
tween dolomite and porphyritic rocks. Fourteen ore bodies under de
ment range 0.6 to 1.8 meters in width, and are traceable circa 1,200 m
showing a great variety of ores, including the principal oxides and carbo
chalcopyrite and tetrahedrite in connection with sphalerite. Has shafts
and 135 meters depth, with about 3,000 meters of workings, estimated to
120,000 metric tons of ore, with about 60,000 tons blocked out for st
Mine was discovered A. D. 1270, and, after various vicissitudes, was reo
1898, by present management. Has steam power and employs 42 men.
pany plans a central electric plant and concentrator with magnetic separ
Production, 1902, was 176,368 lbs. fine copper.

BOB EVANS COPPER MINING CO.

Dead. West Virginia charter forfeited 1902. Formerly had an offi
Toledo, Ohio.

BOBTAIL MINES CO. ARIZ

Dead. Lands now held by Big Lead Mining & Smelting Co. Former
Kelvin, Pinal Co., Ariz.

BOCA DEL COBRE MINING CO. MEX

Office: 509-408 South Spring St., Los Angeles, Cal. Mine office:
Luis del Cordero, Nazas, Durango, Mex. Capt. C. Henry Thompson, presid
J. D. Thompson, vice-president; Lane C. Gilliam, general manager; P.
Mack, assistant manager; Pasadena National Bank, treasurer. Organ
1906. Property, said to have been bought for $300,000, is circa 40 miles f
Pedriceña, and includes El Rosario, San Nicholas, San Francisco and S
Rita mines, all with considerable development, and said to have ore rese
valued at 12,000,000 pesos. The Santa Rita mine, 900′ depth, has a 75-h
hoist. Machinery equipment includes 2 hoists, a 12-drill air-compressor
an electric plant. Company was said, July, 1908, to have ordered a 100

water-jacket blast-furnace. During 1907, property shipped ore, of about 5% average copper tenor, with high silver values, said to have netted $170,000. Management excellent and property considered valuable.

BOCCHEGIANO MINE. **ITALY.**

Owned by Societa Anonima delle Miniere di Montecatini.

KÖNIGLICHE HÜTTENVERWALTUNG BODENMAIS. **GERMANY.**

Mine office: Bodenmais, Bavaria, Germany. Ores are iron and copper pyrites, and products are bluestone and copperas. Employs circa 75 men.

BOGAN RIVER COPPER MINING CO., N. L. **AUSTRALIA.**

Office: 10-114 Pitt St., Sidney, N. S. W., Australia. Mine office: Dandaloo, N. S. W., Australia. H. Ernest A. Miller, agent; Geo. Eason, C. Mooy, Jas. Wallace and A. H. Mellick, directors; Peter Neville, mine manager; J. M. Dean, legal manager. Organized January, 1906, under laws of New South Wales, with capitalization £6,250, shares 2s. 6d. par, in 25,000 fully paid shares and 25,000 contributing shares, latter 9d. paid. Property is 80 acres of crown lands, in the parish of Beaconsfield, Orange Plains district, 50 miles west of Dandaloo and 40 miles west of Frangie railway station, on the Great Western line, held at annual rental of 5s. per acre. Lands, which are well timbered, show a vein outcropping for about 300'. Has shafts of 57', 66' and 145', in a vein of 30" to 3' width, showing exclusively oxidized ores, with considerable iron, about 2,000 tons of high grade ore being in sight. Returns from upwards of 100 tons shipped to the Waratah smelter were 35% copper, 2.5 oz. silver and 1 dwt. gold per long ton. Has a smelter with reverberatory furnace, completed 1907, and tanks for conservation of water. Production, 1906, was 124,440 lbs. fine copper. Employs 25 men.

SOCIÉTÉ MINIERE DE BOGOSLOVSK. **RUSSIA.**

Office: 18 Theatre Place, St. Petersburg, Russia. Mine office: Bogoslovsk, Verkhotsorsky, Perm, Russia. Employs circa 1,000 men. A. Hitrovo, chairman; N. I. Vladikin, general manager. Company has a bond issue of 14,111,183 roubles. Becoming embarrassed, corporation was placed in the hands of trustees, Nov. 3, 1905, since when finances have been greatly improved. A deficit of 2,309,820 roubles was shown Dec. 1, 1905. In 1906 the company made a profit of 226,980 roubles.

The principal business of the company is the manufacture of iron, of which about 75,000 tons of finished products are turned out annually. The property includes iron and steel foundries, a steel rolling mill, chemical works, quarries, coke-ovens, a flouring mill, a 130-verst railway and a fleet of steamers and barges, in addition to mines of copper, gold and iron.

The copper mines are in 4 groups, at a distance of 3 miles, lying on the Siberian side of the Urals, the copper deposits apparently running parallel with the mountains. The country rock adjoining the mine is limestone, of lower Devonian age, through which have erupted granite and porphyry, mingled with tuffs, these being overlaid by tentaculite slate, followed by an eruption of augite-garnet rock, the copper ores occurring along the contact of augite-garnet with other rock formations, lying mainly between the diorite and serpentinite and limestone, occurring in lenticular chutes. The ore is chalcopyrite, with occasional chalcocite, associated with pyrrhotite, barite, calcite, quartz and garnetiferous gangue. The rock in the mines is extremely hard. Mines include the Vasilevsky, 600' deep; Bashmakovsky, 450' deep; Pavlovsky, 750' deep, and Bogoslovsk, 630' deep, these mines having been worked for upwards of a century. The Bogoslovsk ore body is about 600' long, and there is another lense of about 15x50x180'. The main ore bodies ore averaging 2.5 to 3%, which is hand-sorted to an average

tenor of 4.5%. The Vasilevsky was completely equipped with mo chinery, 1904, but proved an expensive failure.

Ore is hand-sorted at surface, and heap-roasted, after which it the smelter, near the mine, having four 48" Pilz furnaces, of 28 tons each; one 55-ton Raschette furnace, 42x144" at the tuyeres, and tw Raschette furnaces, 41x65" at the tuyeres, all furnaces being of brick water-jackets. Fuel is inferior charcoal, made from pine and fir. P a matte of 22 to 35% copper tenor, slags averaging 0.3%. Matte is ized to 98% blister copper, and refined, in brick furnaces, to a tenor

Costs of the Bogoslovsk average as follows, per ton of 2,000 lbs.: $8.09; hand-sorting, 31 cents; roasting, 17 cents; matte smelting, $2 semerizing, 89 cents; refining, 20 cents; management, 35 cents; ad tion and miscellaneous, 95 cents; total, per ton of ore, $13.08, equi 13.78 cents per pound fine copper.

In addition to mining and smelting, the management of the Bo lays out money liberally in a variety of ways, and for a variety of other than of a business nature, these including expenditures for roads a mining college, geological museum, old people's home, charity, fr cines, hospital, etc.

The Bogoslovsk, which is the largest copper property in the Ura deavoring to increase production to about 12,000,000 lbs. fine coppe Production, 1905, was 3,163,190 lbs. fine copper, or nearly 4 times as in 1902, and for 1908 is estimated at 10,500,000 lbs.

BOHEMIAN RANGE COPPER CO. MIC

Dead. Formerly at Mohawk, Keweenaw Co., Mich. Described V

BOLAÑOS MINING CO.

Office: care of M. M. Stephens, president, St. Louis, Mo. Mi Bolaños, Colatlán, Jalisco, Mex. W. C. Stith, vice-president; C. W. Simmo urer; Juan B. Yzabal, general manager; Walter R. Hazel, superi Organized circa 1904 as successor of Bolaños Mining & Milling Co., Property includes sundry mines that were considerable producers in and water rights along the Bolaños River. The Santa Fé mine carri argentiferous copper ore, with about 60 to 80 oz. silver per ton. Has stamp-mill and a concentrator, and plans a hydro-electric power ins Employed circa 50 men at last accounts.

BOLAÑOS MINING & MILLING CO.

Dead. Reorganized, circa 1904, as Bolaños Mining Co. For Bolaños, Colatlán, Jalisco, Mex.

COMPAGNIE DU BOLEO.

Office: 56 Rue de Provence, Paris, France. American office: 614 St., San Francisco, Cal. Mine office: Santa Rosalia, Sur, Baja Califor Paul Mirabaud, chairman; Ernest Michot, director general; M. Demore tary; C. H. Mabant, smelter superintendent; H. Boisse, mining eng Thiere, railway superintendent; G. Boutillier, auditor; J. Jeffroy, m engineer; A. Santillier, purchasing agent.

Organized May 16, 1885, under laws of France, with capit f12,000,000, shares f500 par; debentures, f1,782,000, in bonds of f500 Dividends were f62, 50 centimes each, for 1901 and 1902; f104, 16 in 1903; f135, 4 centimes, in 1904; f200 in 1905; f212 in 1906; and f20 Is supposed to be controlled by the French house of Rothschild. Ow siderable share interest in the Compagnie d'Inguaran. Is exempt, u 17, 1912, from all federal and local taxes, except stamp taxes; is exe custom duties and local dues until 1942; is exempt until 1942 from ex

import duties on fuel consumed; employes are exempt from military and civil service.

Lands, 20,000 hectares, granted by the Mexican government, in 11 groups, also 11,920 hectares of grazing lands south of the mines. Principal groups are the Soledad, Providencia, Purgatorio and Bricas. Lands include 5 known copper deposits of importance, the copper-bearing formation covering 3,000 hectares, with possibilities of further extensions.

The ore occurs in a formation of Tertiary conglomerates, sandstones and tuffs, traversed at certain points by trachyte, the cupriferous tuffs overlying conglomerates of eruptive rock pebbles, and being surmounted by argillaceous tuffs, all traversed by fissures. The ores are of great variety, including cuprite, melaconite, azurite, malachite, crednerite, chrysocolla, atacamite, covellite and chalcocite, chalcocite and covellite predominating. There are three cupriferous beds, the upper averaging about 3′ in thickness, the middle 2′ to 3′, and the bottom 2′ to 10′. The middle bed carries oxide and carbonate ores in oölithic concretions, known locally as boleos, hence the name of the mine. The lowest bed, partly below the water-line, carries sulphide ores, as well as oxides and carbonates. The ore is disseminated through the tuffs in thin, irregular veins, with clay gouge, and has a marked concentration toward the bottom of each bed, where the ore forms compact layers of 6″ to 12″. The main workings are 25 metres to 200 metres above sea-level, the mine being opened by numerous tunnels, and by 7 shafts of the following depths: Sombrero, 98 metres; Carmen, 93m.; Purgatorio, 55m.; Central, 156m.; Amelia, 48m.; Santa Rita, 86m.; San Juan, 86m. The mine is extensively developed, having about 125 kilometres of workings in 1906.

Owing to the peculiar nature of the mine all drilling is done by hand and the ore is so rich that no mechanical concentration is attempted. Ore is hand-sorted and machine-briquetted at a cost of only 1 franc per ton, the argillaceous gangue serving as a natural binder.

The mine has complete steam and electric plants, generating about 2,000 h. p. from steam-engines, of which 1,500 h. p. is transformed by two 3-phase 500-kw. current generators and two 250-kw. 3-phase generators. The electric plant, at Santa Rosalia, furnishes power for hoisting and traction engines, etc., and also current for 50 arc lights and a number of incandescent lamps. The company is courageous in utilizing new and untried machinery, and has a "museyard" containing an immense amount of machinery that has been scrapped. The climate being tropical and the country extremely arid, there is a condensing plant, with 4 powerful pumps, for the distillation of sea-water, and, to obviate evaporation, water distilled is stored in underground wells. Potable water comes from a reservoir on the Yaqui plateau, through a 16,074-metre pipe-line, having pumps at Santa Aguede and Santa Rita.

The smelting plant, rebuilt 1901, had ten 150-ton water-jacket blast-furnaces, but these were replaced, 1906, by 10 new furnaces of larger capacity with 12 to 15 tuyeres each. The smelter has 4 large Connersville blowers driven by two 175-h. p. compound engines. Sea-water for water-jackets is supplied by a duplex pump having a capacity of 2,400 cubic meters per hour, operated by a 250-h. p. engine. Electric locomotives on the slag-line [illegible] molten slag into moulds in rough holes in the ground, and, after cooling, masses of slag are dumped over the end of the breakwater, serving a useful purpose in its extension. The first-fusion product is a matte of [illegible] copper tenor, about one-third of which is refined to black copper at the [illegible], both matte and bars being shipped to Falmouth, England. [illegible] A converter plant should be added to the smelter. Fuel for [illegible] imported German and English coal and coke, and coal briquettes [illegible] mineral fuel. Coke consumption, 1906, was 4,140 tons, [illegible]

The plant includes large and extensive machine-shops, capable of ha all classes of mining work, the property occupying a singularly isolate tion. The town of Santa Rosalia, absolutely controlled by the compar a population of 7,000, dependent solely on the mines and works. The of Santa Rosalia is well laid out, including 4 general stores, warehouse mill, church, 4 schoolhouses, hospital, theatre, amphitheatre and market ing.

The harbor of Santa Rosalia has breakwaters of 650′ and 2,500′, 340-meter jetty and 2 new wharves, the dock having an area of 15 h the breakwaters being composed of large blocks of slag. The harbor include a dredge and three 200-ton lighters used therewith. The port annually about 125,000 tons of freight, in addition to about 7,000,(lumber. The company owns a 350-ton sailing vessel and a steamer, plying between Santa Rosalia and European points. Copper is ship Europe on the steamers of the Compagnie Chargeurs Reunis.

A 30-kilometer private railroad connects the mines with the smel Santa Rosalia, equipment including 9 locomotives and 120 cars.

The labor question has given considerable difficulty, owing to th population of Lower California, necessitating the importation of wo Wages are fairly high, for Mexico, averaging 2 pesos daily for miners, employes are given the benefit of free medical and surgical attendance cines and an excellent hospital service. The importation of 500 Je workmen, 1904, proved unprofitable, only 40 men remaining at the mine end of the year, and tropical labor from Tepic also proved a failure. A number of Chinese coolies were hired, 1903-1904, but of the force of 3,4 employed, January, 1908, only about 200 were Chinese.

The average net copper return from ore smelted was 4.29% in 1900; in 1902, and 3.636% in 1906, when a somewhat lower average grade was used, on account of the high price of copper. Production has b follows. in 1902, from 249,895 metric tons of ore, 10,953 metrics to copper; in 1903, from 230,490 tons of ore, 10,480 tons fine copper; in 190 260,694 tons of ore, 10,350 tons fine copper; in 1906, from 304,940 tons 22,817,610 lbs. fine copper, and in 1907, from 319,850 tons of ore, pro was 24,530,000 lbs. fine copper. It will be noted that the company has s increased ore production, under rather trying circumstances. The prop one of great merit and ably managed.

BOLINAS COPPER MINING CO. CALIFO

Office: 253 Spear St., San Francisco, Cal. Mine office: Bolinas, Ma Cal. T. P. H. Whitelaw, president and manager. Lands, sundry claims northeast of Bolinas, showing 9 veins, 6″ to 2′ wide, in serpentine, on considerable development work has been done. Ore on the dumps is carry 5 to 10% copper. Has a good equipment, including a concer Idle for several years, and company refuses to furnish any statement

BOLIVIAN CONSOLIDATED COPPER CO. BO

Office: 3102-1 Madison Ave., New York, N. Y.

BOMPA SYNDICATE. AUSTI

Mine office: Glassford Creek, Gladstone district, Queensland, Au Presumably idle.

BONANZA BELT COPPER CO. ARI

Office: 31 Nassau St., New York, N. Y. Mine office: Johnson, Co., Ariz. Robert Huntley, president; A. T. Wells, vice-president; H. L. secretary and treasurer; Walter L. Ehrich, superintendent; Gustave N yard, consulting engineer. Organized Oct. 29, 1906, under laws of A with capitalization $3,500,000, shares $10 par. Trust Co. of Americ York, registrar. Lands, 12 claims, area circa 230 acres, including the P

mine, adjoining the Arizona & Michigan, located 1879, which has a 6′ vein giving assays up to 9% copper and 4 oz. silver, and is said to have 16,950′ of workings. Mine is claimed to have produced, under former ownership, about $1,000,000 worth of ore. Present company has shipped some ore running 11.5% copper and 51 oz. silver per ton. In August, 1907, property was attached by the Albert Frank Co. for $40,623.20, for an unpaid advertising bill. Some of the officers are men of excellent standing, but advertising was misleading and mine is not in the same district as the Greene-Cananea, Copper Queen, Old Dominion and United Verde mines, as might be inferred from map printed in company's advertising, although the map carried, in very small letters, a note that it was not drawn to scale. Is not regarded favorably.

BONANZA CIRCLE MINES. **ARIZONA.**

A nickname for the Calumet & Arizona, Superior & Pittsburg, American-Saginaw and Warren Realty & Development properties at Bisbee, Cochise Co., Ariz.

BONANZA COPPER CO. **ARIZONA.**

Mine office: Clifton, Graham Co., Ariz. Said to have been absorbed, 1907, by Copper Company of Arizona.

BONANZA COPPER CO. **MONTANA.**

Office: care of J. H. Tilsey, secretary, Spokane, Wash. Letter returned unclaimed from former mine office, Florence, Ravalli Co., Mont. Jos. Felton, president; A. J. Riese, vice-president; J. W. Doust, treasurer. Lands, 15 claims, known as the Whaley mine, in the Woodchuck district, said to have a 12′ ore body of fair grade, slightly developed by tunnel.

BONANZA COPPER CO. **NEVADA.**

Mine office: Manhattan, Nye Co., Nev. Lands, in East Manhattan, have a 131′ shaft showing stringers of ore assaying about 4% copper, with gold values. Presumably idle.

BONANZA COPPER CO. **NEW MEXICO.**

Mine office: Las Vegas, San Miguel Co., N. M. Chas. N. Petteys, president and manager; Geo. H. Hunter, secretary. Has steam power, a small concentrator and a 25-ton leaching plant.

BONANZA DE COBRE MINING CO. **MEXICO.**

Dead. Succeeded, circa 1907, by Elenita Development Co. Formerly at La Cananea, Arizpe, Sonora, Mex.

BONANZA DEVELOPMENT CO. **MEXICO.**

Dead. Sold lands, 1899, to Santa Rita Mining Co. Formerly at Santa Rita, Grant Co., N. M.

BONANZA MINE. **ALASKA.**

The Bonanza mine in the Copper River district, Alaska, is owned by the Kennicott Mines Co.

BONANZA MINE. **ALASKA.**

The Bonanza mine, on Latouch Island, Alaska, is owned by A. K. Beatson, et al.

BONANZA MINING CO. **BRITISH COLUMBIA.**

Dead. Formerly at Observatory Inlet, Cassiar district, B. C.

BONANZA MINING CO. **IDAHO.**

Office and mine: Montpelier, Bear Lake Co., Idaho. M. L. de Julien, president and general manager; C. N. Sweet, vice-president; A. D. Young, secretary; F. C. Plummer, treasurer. Organized November, 1905, under laws of Idaho, with capitalization $5,000,000, shares $1 par, succeeding Montpelier Copper Mining & Smelting Co. Lands, 23 claims, unpatented, area 460 acres, situated 3 miles southwest of Montpelier, include the Duke, Emerald and other claims, showing auriferous and argentiferous copper ore in a vein of about

30′ width with a 5′ paystreak. Has a 200′ two-compartment shaft, planned to be sunk to 600′, on the Duke claim.

BONANZA MINING CO. **MEXICO.**

Office: care of Chas. Sidlar, secretary, Sunbury, Pa. Mine office: Ameca, Jalisco, Mex. Hon. Thos. Savage, president; E. J. Callahan, general manager. Organized 1905, by shareholders of the Amparo Mining Co., to take over the Barranca mine, bought for $30,000. Presumably idle.

BONANZA MINING & SMELTING CO. **WASHINGTON.**

Office: 81 Sullivan Bldg., Seattle, Wash. Mine office: Index, Snohomish Co., Wash. Chas. Lovejoy, superintendent. Lands are the Edison group, 15 claims, in the Silver Creek district, opened by tunnels aggregating 2,100′ length, showing auriferous copper ores. Has water power.

BONANZA MOUNTAIN GOLD MINING CO., LTD. **BRITISH COLUMBIA.**

Mine office: Grand Forks, Boundary district, B. C. Has low-grade auriferous and argentiferous copper ores. Idle for several years.

BONANZA QUEEN MINING CO., LTD. **WASHINGTON.**

Office: Minneapolis, Minn. Mine office: Silverton, Snohomish Co., Wash. J. H. Eaton, superintendent. Lands, 8 claims, showing 4 veins, said to be proven by gorges for length of about 4,000′. Main vein is claimed to average 60′ width, with extreme width of 134′. Has a 1,090′ crosscut tunnel. Ten carloads of ore shipped to Tacoma smelter gave returns of $14.50 per ton.

BONITO COPPER CO. **ARIZONA.**

Mine office: Safford, Graham Co., Ariz. Planned installing a leaching plant. Idle.

BONMAHON COPPER MINES DEVELOPMENT SYNDICATE, LTD. **IRELAND.**

Office: Broad Street House, London, E. C., Eng. Mine office: Waterford, County Waterford, Ireland. Sir Jas. Aloysius Power, chairman; H. J. Dixon, secretary; Arthur Llewellyn Pearce, consulting engineer; Herbert T. Marks, mine manager. Organized Nov. 16, 1905, under laws of Great Britain, with capitalization £30,000, shares £1 par.

Lands, 190 acres, on Bonmahon Bay, 17 miles from Waterford, including the Knockmahon and Tankardstown mines, which, 1827-1865, under the ownership of the Mining Company of Ireland, had an authenticated production of £1,339,232, from which profits of £534,011 are said to have been made. Ore extracted during this period is said to have averaged 10%, but must have been secured by very careful hand-selection. After 1875, under a different management, mines are said to have produced about £900,000 worth of ore. The Bonmahon mines are very ancient, having been worked as early as the Sixteenth Century. Last mining work preceding present ownership was done 1878.

The Knockmahon ore body, said to be traceable 5 miles to Kilmackthomas, occurs in clay-slates. Annual production was about 1,000 tons fine copper, circa 1840. The Tankardstown mine, running under the sea for some distance, is said to show considerable bodies of ore of concentrating grade. The Bonivy mine, 300′ deep, has been unwatered. Property as a whole shows large reserves of low to medium grade ores, and is considered decidedly promising, but to be profitable must be operated on a good scale. At last accounts company planned reorganization, on basis of about £200,000 capitalization.

BONNEY MINING CO. **NEW MEXICO.**

Dead. Formerly at Lordsburg, Grant Co., N. M. Described Vol. VI.

BONNIE BELLE MINING & MILLING CO. **WYOMING.**

Dead. Formerly at Rudefeha, Carbon Co., Wyo.

BONNIE DUNDEE MINING CO., N. L. **AUSTRALIA.**

Office: Cobar, N. S. W., Australia. Mine office: Hermidale, N. S. W., Australia. M. J. Corbett, chairman; preceding officer, J. A. Draper, A. J. L. Flashman, E. B. Trentt and R. A. Sorensen, directors. Property, carrying auriferous copper ore of some promise, is slightly developed.

BOODLE MINING SYNDICATE, LTD. **COLORADO.**

Office: 46 St. Mary Axe, London, E. C., Eng. Letters returned unclaimed from former mine office, Central City, Gilpin Co., Colo. John Peter Reid, chairman; Chas. Pearson, secretary; W. J. Richards, superintendent. Capitalization, £15,000, shares £1 par; issued, 7,500 shares, 15s. called up. Ores carry gold, silver and copper. Idle for some years and apparently moribund.

BOPPY BROKEN HILL COPPER MINE, N. L. **AUSTRALIA.**

Mine office: Cobar, Robinson Co., N. S. W., Australia. Organized circa December, 1907, under laws of New South Wales, with capitalization £22,500, shares £5 par. Mine has a 200′ shaft, showing, at bottom, ore estimated to average 30% copper.

BOPPY MOUNTAIN CO. **AUSTRALIA.**

Mine office: Cobar, Robinson Co., N. S. W., Australia. Organized 1906, with capitalization £3,000, shares £5 par. Lands, 28 claims, 2 miles north of Mount Boppy gold mine, adjoining the Boppy Blocks mine on the north, showing a strong gossan capping. Idle at last accounts.

COMPAGNIE FRANCAISE DES MINES DE BOR. **SERVIA.**

Office: 60 Rue de la Victoire, Paris, France. Mine and works office: Bor, Zeyetchar, Timok, Servia. Original capitalization of f5,500,000 was increased, 1908, to f7,000,000.

Lands are a 50-year concession with privilege of renewal, known as the St. George, covering 2,400 hectares, and the lease of 6,500 hectares additional lands, in the communes of Bor, Krivelj and Ostrelj, lying circa 13 miles south of Majdenpek. Property shows prominent gossans carrying considerable limonite, ores occurring in a belt of 1 to 2 miles width by about 10 miles length, in fissure veins up to 50′ and even 100′ width, traversing andesite and volcanic tuffs and breccias. Ores include chalcocite, covellite, bornite, chalcopyrite and enargite, associated with galena, sphalerite and pyrite, all slightly auriferous and argentiferous. At Krivelj, a vein of about 40′ width gives average ores of 5.5% copper. At Cuka-Dulkan, a vein of 27 meters extreme width has given average assays of 6% copper. At Crveno-Brdo there are 3 irregular chimneys, averaging 80′ in width, giving average returns of 7% copper. A branch of the Budapest & Constantinople railway is being built to the Bor district. Smelter has 2 blast furnaces, 360-h. p. Babcock & Wilcox boilers and a converter with one stand and four shells.

BOREN GULCH MINING CO. **COLORADO.**

Office: care of Henry C. Deeming, general manager, Harrisburg, Pa. Mine office: La Plata, La Plata Co., Colo. G. C. Cornell, superintendent. Ores are complex auriferous and argentiferous copper, lead and zinc sulphides. Has steam power.

BORNITE COPPER CO. **MONTANA.**

Office: 150 Fifth Ave., New York, N. Y. Mine office: Blackfoot, Teton Co., Mont. Jas. B. Holmes, vice-president; Frank Meyer, secretary. Organized with capitalization $5,000,000, shares $5 par, as successor of Imperial Montana Copper Mining, Smelting & Water Power Co., which was successor of Blackfoot Copper Co. Lands are variously reported as 8 claims, area 160 acres, and as 19 claims, on the north side of Boulder Creek, in the ceded strip of the

Blackfoot Indian Reservation. Mine has 5 tunnels. Said to have los which were held under bond and lease, and is moribund.

BORNITE COPPER & GOLD MINING CO. ARI

Dead. Formerly at Wickenburg, Maricopa Co., Ariz.

BORNITE COPPER & GOLD MINING CO. WASHIN

Office: care of C. W. Coffin, president, Bangor, Me. Mine office: rington, Snohomish Co., Wash. Wilbur E. Frank, secretary; C. G. general manager; Wm. Hancock, superintendent. Organized under la Washington, with capitalization $2,500,000, shares $1 par. Lands, 11 cla the Stillaguamish district, showing strong outcrops of auriferous and arge ous bornite and chalcopyrite. Development is by a 2,689′ tunnel, and a tunnel was planned. Has water power and is said to have an aerial April, 1908, was offering 1-year 7% notes to shareholders in efforts t funds. Presumably idle.

BORTLE COPPER-GOLD CO. WASHIN

Office: 822 Penobscot Bldg., Detroit, Mich. Mine office: Republic, Co., Wash. C. Eugene Bortle, president; Chas. E. Murphy, vice-pre Chas. Kohn, secretary and treasurer; preceding officers, Ralston MacCa Chas. Storch, directors; E. J. Delbridge, general manager. Organized Ju 1906, under laws of Washington, with capitalization $1,200,000, shares $ issued, $800,000.

Lands, 4 claims, area 80 acres, held under bond and lease, also an millsite and 160 acres miscellaneous lands, in the Lambert Creek d adjoining the Belcher mine on the south. Mine has a 357′ tunnel and incline shaft, on the northern extension of the Belcher vein, showing aur sulphide ore giving average assays of about 3% copper. Company is have expended about $65,000 on the property. There is a sawmill smeltersite, on Curlew Lake, where a matting furnace is planned, tent Idle, but plans early resumption.

BOSCASWELL UNITED TIN & COPPER MINE, LTD. ENG

Mine office: St. Just, Cornwall, Eng. Organized circa June, 1908, laws of Great Britain, with capitalization £200,000, shares £1 par, in ha ferred ordinary and half deferred ordinary shares, latter allotted to ven purchase consideration. Lands, 7 setts, including the North Boscaswell Calartha Common and Bortherras mines, about 2 miles from St. Just. regarded favorably.

BOSSMO KISGRUBER. NOR

Mine office: Baasmoen, Ranen, Norway. Ore is slightly cupriferous assaying 0.5% and upwards in copper, and up to 50% sulphur, latter el furnishing the principal ore values. Yearly production is about 20,000 t pyrite, and circa 25,000 lbs. fine copper.

BOSTON & ARIZONA CONSOLIDATED COPPER CO. ARI

Dead. Formerly had an office at 501-7 Water St., Boston, Mass.

BOSTON-ARIZONA COPPER CO. ARI

Office: 1012-60 State St., Boston, Mass. Letter returned unclaimed former mine office, Globe, Gila Co., Ariz. Hon. Chas. M. Bruce, pre Lands, 21 claims, near the McMillen, in the Richmond Basin, 20 miles Globe.

BOSTON & ARIZONA COPPER CO. ARI

Office: 131 State St., Boston, Mass. Apparently moribund.

BOSTON-ARIZONA GOLD & COPPER MINES CO. ARI

Dead. Formerly had an office at 405-31 State St., Boston, Mass.

BOSTON-ARIZONA MINING CO. ARI

Dead. Formerly at Wickenburg, Maricopa Co., Ariz. Described V

BOSTON & ARIZONA SMELTING CO. **ARIZONA.**

Letters returned unclaimed from former office, 302 Mills Bldg., San Francisco, Cal., and former works office, Benson, Cochise Co., Ariz. Riley A. Boggess, manager. Organized 1907, under laws of Nevada, with capitalization $2,500,000, shares $100 par, as successor of the Southwestern Smelting & Refining Co., which succeeded the Empire Smelting Co. Lands, 60 acres, on the main line of the Southern Pacific. Has a 200-ton water-jacket blast-furnace, No. 7 Connersville blower, electric power plant, sampling plant with 500-ton Vezin automatic sampler, and an artesian well. Smelter never was blown in. Has an old slag-dump, from a previous smelter, containing circa 100,000 tons of slags, assaying about $5 per ton in values, which probably could be remelted. Moribund.

BOSTON & BRITISH COLUMBIA COPPER MINING & SMELTING CO. **BRITISH COLUMBIA.**

Dead. Lost property by attachment.

BOSTON & BRITISH COLUMBIA MINING CO. **BRITISH COLUMBIA.**

Office: 39 Cortlandt St., New York. Mine office: Granite Creek, Yale district, B. C. Moribund.

BOSTON & CAROLINA COPPER MINING CO. **NORTH CAROLINA.**

Dead. Formerly at Baker City, Granville Co., N. C.

BOSTON CLIMAX GOLD-COPPER MINING & INVESTMENT CO. **WASHINGTON.**

Office: Union Trust Bldg., Providence, R. I. Benj. F. Harrington, president. Lands, circa 240 acres, in Stevens county, Washington, on which about $25,000 has been spent in development work. Idle for several years.

BOSTON-COLBY COPPER MINING CO. **MONTANA.**

Office and mine: Saltese, Missoula Co., Mont. John Bauer, president; Andrew Flaig, secretary, treasurer and general manager. Organized Sept. 16, 1903, under laws of Montana, with capitalization $1,000,000, shares $1 par. Lands, 7 claims, area 140 acres, also a 5-acre millsite, in the St. Regis district, near Saltese and rail connections. Has a shallow shaft and tunnels of 400′ and 880′, showing 5 ore bodies, claimed to have given average assays of 15% copper, 10 oz. silver and $5 gold per ton. Presumably idle.

BOSTON-COLORADO COPPER CO. **COLORADO.**

Dead. F. H. Colvin was president and general manager. Capitalization, $1,000,000. Is said to have paid $200 for the property. Company claimed a preposterous tonnage of 4% ore above water level. Claimed to have 4 tunnels, aggregating about 2,000′ in length, and claimed an ore body showing an 85′ outcrop, traceable 4,500′. Dennison, the former secretary, is in bankruptcy and gave a bill of sale on unpaid stock, apparently perjuring himself, and Colvin was arrested for taking the bill of sale. Both Colvin and Ecke were indicted, 1907, on complaint of the United States government, for using the mails with intent to defraud. The 100-ton mill and dividends promised, 1906, have not materialized. Was a swindle. Formerly at 124 F St., Salida, Chaffee Co., Colo.

BOSTON-COLORADO COPPER MINING CO. **COLORADO.**

Letter returned unclaimed from former office, 50 White St., New York. Mine office: Fort Collins, Larimer Co., Colo. Edwin M. Keiser, president; Stanford Stark, vice-president and general manager; Roger C. Turner, secretary. Organized 1899, under laws of Arizona, with capitalization $1,000,000, shares $1 par. Lands, 7 patented claims, area 63 acres, in the Howes Gulch district, showing carbonate and sulphide ores, giving assays of 7 to 8% copper, 1 oz. silver and $2.60 gold per ton, developed by shafts of 40′ and 240′

and two 200′ tunnels. Has steam power and necessary mine buildings. some years and moribund.

BOSTON & COLORADO SMELTING CO. **COLOR**

Office: Boston Bldg., Denver, Colo. Works office: Argo, Denver Colo. C. C. Converse, president; Geo. D. Edmunds, secretary; Crawford managing director; Harold V. Pearce, general manager. Has a 250-ton s ing plant, with steam and electric power, doing a general custom sme business. Employs about 200 men.

BOSTON CONSOLIDATED COPPER & GOLD MINING CO., LTD. **U**

Office: 62 New Broad St., London, E. C., Eng. Mine office: Bin Canyon, Salt Lake Co., Utah. John E. Dudley Ryder, chairman; Samuel house, general manager; preceding officers, Chas. S. Henry, M. I. Newh Frank A. Schirmer, Eugene Meyer, Jr., and Capt. Stephen H. Pollen, direc G. H. Johnson, secretary. Organized May 14, 1898, under laws of G Britain; capitalization increased, August, 1905, to £725,000, shares £1 issued, £625,000. Has a first-mortgage debenture issue of £252,000, at convertible into shares at £3 or redeemable at £105 on 6 months no Property is held through an American corporation, the Boston Consolid Mining Co., under which title the mine is described. Practically the e stock issue of the American corporation is held by the British parent pany, and funds of the latter are loaned to the American corporation. S are listed on the London and Boston stock exchanges.

BOSTON CONSOLIDATED MINING CO. **U**

Office: 79 Milk St., Boston, Mass. Operating office: 608 Dooly B Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Samuel Newhouse, president; Frank A. Schirmer, vice-president, secretar treasurer; Lafayette Hanchett, general manager; Louis S. Cates, gener perintendent; S. H. Horner, mine superintendent; A. J. Bettles, mill su tendent; Geo. G. Wald, engineer.

Organized under laws of New York, with capitalization $1,000,000, $100 par, entire capital stock, except founders shares, being owned b Boston Consolidated Copper & Gold Mining Co., Ltd. Owns 20% of stock of Garfield Improvement Co., which holds the townsite of Garfield, Uta first-mortgage of $1,500,000, Federal Trust Co., New York, trustee, w corded circa February, 1908, to cover the convertible bond issue of Dec 1907, by the English parent company. Pressing needs during the 1907 were met by the personal endorsements of directors Frank A. Schirme Samuel Newhouse, for which they deserve great credit, and the thanks shareholders. During 1907 the company expended, for mill constr $782,654, and spent upwards of $900,000 for mine development, machine other construction account.

Lands, 51 claims, area 379 acres, patented, also the old 200-acre m the Pelican Point millsite of 1,085 acres, the Garfield millsite of 910 and 680 acres miscellaneous lands. Country rocks are limestone, porphyr quartzite, and the ore is mainly chalcopyrite, with occasional bornit disseminated chalcocite.

The Boston Consolidated really is two mines in one, the original having been opened on fissure veins in limestone and quartzite. Late work of the Utah Copper Co. led to the investigation of the monzonit bodies of the Boston Consolidated and a monstrous porphyry mine has developed thereon. Company estimates that the ores of the Sulphide average 2.5% copper, 2 oz. silver and $2 gold per ton, and that the por ores average 1.6% copper, 0.25 oz. silver and 30 cents gold per ton.

The Sulphide property, which was the original mine, has an area of

acres, containing 15 known ore bodies. Two veins are being developed, these having a generally east and west strike, with average dip of 28° N., ore shute being estimated at 160′ width and 340′ length. During 1907 a new and promising ore body was opened by Armstrong No. 1 tunnel. Some of the best ore of the Sulphide mine returns better than 10% copper, with corresponding increase in gold and silver values, but the average return of all sulphide ores, 1906, was 2.802% copper, with a 6% loss in smelting. During 1907 there were 7,799′ of new openings made in the Sulphide mine, which has about 6 miles of workings. The Armstrong No. 1 tunnel, which is the main working artery, has an electric haulage system. The Peabody tunnel shows a body of sulphide ore 190′ in width. Other principal tunnels of the Sulphide mine are Armstrong No. 2, Work, Phoenix and Ingersoll.

The Porphyry mine is opened by 15 tunnels, with about 7 miles of workings, and consists, not of a vein or contact deposit, but of 110 acres of country rock, with values continuing to an undetermined depth. The porphyry is monzonite, a somewhat complex anhydrous silicate of aluminum, sodium, potassium, calcium, manganese and iron, the porphyry ore body being a continuation of the monzonite ore of the Utah Copper Co. The company estimates 52,000,000 tons of porphyry ore in sight. It is probable that, eventually, this ore body will be found to contain between 100,000,000 and 200,000,000 tons of ore, part of which probably will be unworkable, owing to its extremely low copper tenor. The porphyry ores, estimated by the company to average 1.6% copper, range down in tenor to 0.7% copper, which probably is unworkable, at present. The porphyritic ores are mined and overburden stripped by four 90-ton steam shovels, stripping being removed at a cost of 5 to 10 cents per ton, each shovel being capable of handling 2,000 to 3,000 tons daily of overburden or ore, which is broken by blasts, deep holes for charges being bored by Keystone drills.

Mine equipment includes a 700-h. p. steam plant, with 3 cross-compound air compressors, of 60 drills aggregate capacity. Mine buildings include a 60x80′ machine shop, 30x40′ carpenter-shop, 3 smithies, etc.

There is a 2,000′ ineline tram, with double tracks, laid with 36-lb. rails, having 2 Stine drums at the top of the terminal, operating 13-ton skips, estimated capacity of line being 6,000 tons daily. There are 3,000-ton steel ore-bins at the terminal, on Carr Fork, and a half-mile railway connecting with the Rio Grande and Copper Belt railways. The company has a 5-mile private narrow-gauge railway, equipped with 12 locomotives and 190 ore cars.

The 3,000-ton mill, at Garfield, costing upwards of $1,500,000, is in 6 units of 500 tons each, with 13 operating units. The mill is 370x555′ in size, built of steel and concrete. Equipment includes 18,000-ton main ore-bins, 4 Gates crushers, 312 Nissen individual stamps, 284 Wilfley tables, 256 Johnson tables and 312 Callow settling tanks. The mill has no elevators, all material being handled by gravity. Water is supplied partly from springs on the millsite, but mainly by the Garfield Water Co. The mill has a large reservoir.

Miscellaneous buildings at the millsite, all of steel and concrete, include a 60x160′ machine-shop, 40x40′ carpenter-shop, smithy, etc.

The porphyry ores have given decidedly disappointing results in initial production, but it is hoped that better returns can be secured. The top of the porphyry ore deposit shows a considerable excess of iron, and the mill has given an average extraction of about 70% only of the ore values. The porphyry ores can be concentrated about 20 into 1, though necessarily with heavy tailings loss. The porphyry ores, for the first half of 1908, gave smelter returns of only 19 to 22 lbs. fine copper per ton, concentrates averaging 14 to 18% copper and circa 25% iron. It is hoped that ore mined may be brought

to an average of about 1.5% copper, with an 80% extraction, which woul 24 lbs. fine copper per ton, less small smelter losses.

Production has been secured for several years from the sulphide output, 1906, having been 3,565,483 lbs. fine copper, and 6,146,125 lbs. fi per, 78,128 oz. silver and 12,446 oz. gold in 1907. The company pl eventual production of about 30,000,000 lbs. fine copper yearly. Costs were figured at 8.55 cents per pound, deducting gold and silver values, b including construction of mill or sundry heavy expenses of mine develo It is hoped to have the property producing at full capacity during 1909. withstanding the disappointing results given by the porphyry ores in 19 mine, by reason of its almost incomprehensible tonnage of porphyry o one of great possibilities, and the management is vigorous and resourcef

BOSTON & CORBIN COPPER & SILVER MINING CO. MON

Office: 82 Devonshire St., Boston, Mass. Mine office: Corbin, Je Co., Mont. Nathan L. Amster, president; A. B. Clough, vice-president; Jeffers, secretary and treasurer; Homer E. Emerson, general manage ceding officers, Jas. A. Houston and David A. Ellis, directors. Organize 30, 1906, under laws of Maine, with capitalization $500,000, shares $ issued, $400,000. Boston Safe Deposit & Trust Co., transfer agent. B Trust Co., Boston, registrar.

Lands, 9 claims, area circa 175 acres, 1 mile from Corbin and 43 mile Butte, including the Bertha mine, with about 4,500′ of strike of the vein. Country rock is granite with intrusive porphyritic rocks, vein sys the Bertha consisting of a number of parallel fissures. Geological con are markedly similar to those at Butte, though ore is mainly chalc instead of chalcocite as at Butte, with some enargite, all argentiferous Bertha has 6 different veins, of about 2′ average, width, in addition to th Bertha vein, which is a well defined fissure, in granite, of 6′ to 18′ width, ing an 18″ to 2′ paystreak. Silver values increase with depth, ranging oz. per ton in the upper workings, and 12 to 22 oz. per ton on the lowe First class ore averages about 7.8% copper and second class ore 4.6% average of all ore shipped from beginning of operations to Apr. 1, 1908, 5.64% copper and 7.7 oz. silver per ton. Property adjoins the old Alta claimed to have produced about $20,000,000 worth of silver, and whic posedly was opened on a continuation of the Bertha vein.

The mine had about 3,500′ of workings, when taken over by presen pany, development being by two 900′ tunnels and a 200′ shaft. New m ment has begun a third tunnel and deepened the 2-compartment Gregor to 500′, and plans sinking to 1,000′. Is crosscutting, on the 500′ level, the parallel veins.

Equipment includes a 500′ hoist and 10-drill air-compressor, with ne mine buildings and shops. Cost of wagon freight to railroad is $2 per ore, and an aerial tram is planned.

Company ended fiscal year, July 31, 1907, with cash and bills rec of $73,218.81, with liabilities of $6,947.21. Small ore shipments have been from development work, to the Butte Reduction Works, and production was 157,000 lbs. fine copper.

The company is modestly capitalized and is being developed with by experienced mining men who have proven successful in other fields Corbin district has been called, by its friends, another Butte, but ha given a black eye by reason of the failure of numerous small mining prises. These, however, were inadequately financed, and, as a rule, were managed, hence the real value of the district remains to be demonstrated prospects of the Boston & Corbin seem good.

BOSTON-ELY COPPER CO. **NEVADA.**

Office: 110 State St., Boston, Mass. Mine office: Ely, White Pine Co., Nev.

BOSTON-ELY DEVELOPMENT CO. **NEVADA.**

Dead. Organized 1906, under laws of Maine, and reorganized, circa November, 1907, as Boston-Ely Mining Co. Formerly at Ely, White Pine Co., Nev.

BOSTON ELY MINING CO. **NEVADA.**

Office: 84 State St., Boston, Mass. Mine office: Ely, White Pine Co., Nev. Employs 15 men. Arthur L. Robinson, president; Chas. H. Farnsworth, vice-president; Jerome C. Smith, secretary and treasurer; preceding officers, Geo. E. Keith, Jos. N. Smith, Wm. D. Elwell and S. Herbert Williams, directors; Ed. W. Ralph, superintendent. Organized November, 1907, under laws of Maine, with capitalization $2,000,000, shares $10 par; $3.15 paid in; issued, $1,700,000. Was a reconstruction of the Boston-Ely Development Co., giving new stock for development stock, stamping latter $3 paid and levying a 15-cent assessment. Owns a two-thirds stock interest in the Ely Western Copper Co.

Lands, 22 claims, patented, area 300 acres, including the Colorado-Ely group, about one-half mile from the Cumberland-Ely and Giroux, and in the vicinity of the Rickard-Ely, opened by the 710′ Emma shaft, showing low grade copper ore in drifts on the 710′ level. Also has 2 fissure veins, said to carry high grade ore, from which small shipments have been made, but if a considerable ore body is developed by the Emma shaft, presumably it will be found quite deep. Has a 15-h. p. hoist and several camp buildings. Company is now deepening shaft and prospecting below the oxidized zone. Lands have been partially explored by churn drill. Management seems efficient, and property is considered as not devoid of promise.

BOSTON EXPLORATION CO. **WASHINGTON.**

Office: Old South Bldg., Boston, Mass. F. E. Houghton, fiscal agent. Organized 1906, with capitalization $5,000,000, shares $5 par. Is a holding company, organized to control the Mineral Hill Tunnel Mining Co. and Mineral Hill Mining Co., both of Ferry county, Washington; the Triune Gold Mining Co. in the Wannieutt Lake district of Okanogan county, Washington, and the Providence Mining Co. in the Cedar Cañon district of Stevens county, Washington.

BOSTON GOLD-COPPER CO. **ARIZONA.**

Dead. Reorganized as Growler Copper Co. Formerly at Gila Bend, Maricopa Co., Ariz.

BOSTON GOLD-COPPER SMELTING CO. **COLORADO.**

Office: 403 Cooper Bldg., Denver, Colo. Works at Leadville, Lake Co., Colo., were leased, 1902, for 10 years, to the Republic Smelting Co.

BOSTON-GREENWATER COPPER CO. **CALIFORNIA.**

Office: Butte, Mont. Mine office: Greenwater, Inyo Co., Cal. W. A. Kidney, president; J. P. Nelson, vice-president and general manager; E. H. Lattimer, secretary; Hon. John MacGinnis, treasurer; Daniel P. Murphy, superintendent. Organized October, 1906, under laws of Arizona, with capitalization $1,250,000, shares $1 par. Lands, 11 claims, area 175 acres, lying about 1 mile east of the Furnace Creek Copper Co., instead of immediately adjoining, as claimed. Lands are claimed to show a wide vein, with numerous cross fissures, giving assays of 25 to 50% copper, but actually having an 8′ vein giving average assays of about 5% copper. There were various charges of fraud in connection with sale of stock in this company by brokers, leading to the arrest of Secretary Lattimer, Miles Almy and Dr. Grant Lyman. Apparently Almy was innocent of intentional fraud, and Lyman, who was at the head of the Union Securities Co., managed to escape punishment, though undoubtedly

having sold an immense amount of stock through misrepresentation. Id
presumably moribund.

BOSTON-IDAHO MINING CO. I

Offices: 306-147 Milk St., Boston, Mass., and 6 First Natl. Bank
Ogden, Utah. Letter returned unclaimed from former mine office, Ni
Lemhi Co., Idaho. R. P. Hunter, president and treasurer; Frank H. C
vice-president and eastern manager; Ernest J. Waugh, secretary;
Pierce, superintendent; Thos. Hampton, mine superintendent. Organize
ruary, 1902, under laws of Utah, with capitalization $200,000, shares $
Lands, 8 claims, area circa 100 acres, including the Ontario mine on
Mountain, in the Spring Mountain district, having 8 tunnels, with about
of workings, claimed to have produced upwards of $1,000,000 in the past
secured ores assaying up to 27.5% copper, 57% lead, 40 oz. silver and $1.
per ton. The L. Diamond Co., of Boston, advertised this stock, 1907,
that 5% quarterly dividends would begin next month, and company is re
with suspicion. Postmaster at Nicholia stated no such company there.

BOSTON-JARILLA COPPER CO. NEW ME

Mine office: Orogrande, Otero Co., N. M. Lands, 7 claims, adjoini
Molly Gibson, from which a little copper and silver ore of good grade ha
shipped.

BOSTON & JEROME COPPER CO. ARI

Office and mine: Jerome, Yavapai Co., Ariz. Jos. Larson, pre
J. C. Scott, vice-president; A. A. Macpherson, secretary and treasure
ganized April, 1908, under laws of Arizona, with capitalization $1,5
shares $1 par, increased, May, 1908, to $2,500,000, shares $5 par. La
claims, area 146 acres, known as the Juniper group, circa 2 miles so
Jerome, having a 130′ shaft sunk on a large porphyry and schist dyke, ca
carbonate copper stains. Also has tunnels of 50′ and 60′. Suspended
tions circa February, 1908, but plans resumption.

BOSTON & LAKE SUPERIOR COPPER MINING CO. ONT

Dead. Formerly at West Superior, Douglas Co., Wis.

BOSTON & MEXICO GOLD & COPPER MINING CO. ME

Dead. Formerly at Ameca, Jalisco, Mex. Described Vol. VI.

BOSTON-MEXICAN MINES CO. ARIZONA & ME

Office: 141 Broadway, New York, N. Y. Mine offices: Twin
Pima Co., Ariz., and Hermosillo, Sonora, Mex. S. E. Otis, president;
Holder, vice-president; Augustus H. Vanderpool, secretary and treasurer
J. Eames, Jr., general manager. Organized under laws of Arizona, wit
talization $4,000,000, shares $5 par. American Loan & Trust Co.,
registrar; Federal Trust Co., Boston, transfer agent. Lands include
copper, silver and gold claims. The Copper Beauty group of 10 claims,
Twin Buttes district, has a shallow shaft and is said to give average
of 5 to 8.5% copper from surface ores. El Sol mine, 9 miles from Lla
2 shallow shafts in veins of 3′ to 4′ width, giving assay values in copp
and silver. The Carmen and Adriana mines are said to be near the
Mountain, in Sonora, and to carry somewhat similar ore. The Caliche
in the Magdalena Mountains, supposedly has gold ores. The Concepció
is a silver property, 20 miles west of Agua Zarca, northern Sonora. The
mine is a silver property near the Concepción. La Azurena mine is sai
3½ miles from Cerro Azul, Sonora, which is not a postoffice, and to have
showing a vein of 5′ to 25′ width, giving assays of 35 to 290 oz. silver p
Company was said, April, 1907, to have secured circa 1,200 acres of
lands in the Cananea district. Company is not regarded with especial

BOSTON & MONTANA CONSOLIDATED COPPER & SILVER MINING CO. MONTANA.

Office: 42 Broadway, New York, N. Y. Mine office: Butte, Silver Bow Co., Mont. Works office: Great Falls, Cascade Co., Mont. Sidney Chase, president; John D. Ryan, managing director; David B. Hennessy, secretary and treasurer; preceding officers, Andrew B. Grafius and Jas. Phillips, Jr., directors; Chas. W. Goodale, general manager; John C. Adams, general superintendent; A. E. Wheeler, smelter superintendent; Lee Hayes, engineer; Wallace Corbett, mine foreman.

Organized July 19, 1887, under laws of Montana, and reincorporated, July 19, 1907, with capitalization $3,750,000, shares, $25 par. Debentures, $2,100,000 issued, at 7%; $200,000 outstanding. Practically entire stock issue is owned by Amalgamated Copper Co. Dividends, to Dec. 31, 1907, were $57,725,000. Dividend disbursements have been as follows: $35 in 1901; $6 in 1902; $8 in 1903; $8 in 1904; $40 in 1905; $48 in 1906; $42 in 1907. Quarterly dividends, January, April and July, 1908, were $3 each.

Lands, 483 acres, including working mines, idle properties partially developed, prospected claims and undeveloped mineral lands, also various part interests in sundry full and fractional claims in the Butte district. Miscellaneous lands include an extensive smelter-site, with valuable water rights, at Great Falls, and coal mines at Sand Coulee, 16 miles from Great Falls.

The ore bodies of the various mines are very extensive, and reserves of smelting grade ore alone were estimated, 1906, at about 3,000,000 tons, and probably were larger in 1908. The mine has some stopes of medium to high grade ore nearly 200′ in width, and is opened several years ahead of any possible requirements. Production is approximately 15% smelting ore and 85% concentrating ore. The ores are notably rich in silver and gold, returning an average of 0.025 oz. silver, valued at 1⅜ cents, and ¼ cent in gold, for each pound of copper produced.

The Leonard, which is the principal mine of the Boston & Montana at present, has an old 1,129′ shaft, which became badly drawn, circa 1905, and a new 4-compartment shaft of 1,400′. The Leonard has a very large vein, carrying exceptionally good gold values. Mine is timbered with 12x12″ and 14x14″ square sets, requiring monthly an average of about 1,000,000′ of mine timber, board measure, as solid bulkheading is required in most stopes, owing to width of the vein. The mine has electric lights and bells, and steam and electric pumps. Some trouble was had on account of fire in 1907. Water from the Mountain View, East Colusa and West Colusa mines drains to the 1,200′ level of the Leonard, and is forked thence by a Nordberg duplex station pump, with steam-end 20x40x42″ and 42x7½″ plungers, steam-end being fitted with Corliss valves and carrying a fly-wheel. The water-end was made by the company, and cast in the Silver Bow foundry, at Butte. Valves are of pot form, and the entire water-end is phosphor-bronze, columns being lined with wood, thoroughly soaked with oil and coated on the inside with hot tar, to withstand the corrosive action of the mine waters. There also are 2 Nordberg quintuplex pumps, of 600 gallons capacity each, on the 400′ level. Surface plant at the Leonard is very complete, including a 152′ steel headgear and 2,000-ton ore bins. The power plant has ten 250-h. p. boilers, and a 22x72″ Nordberg hoist, good for 3,500′ depth, hoisting cages with 10-ton skips swung under, with 1½″ round cable. There also is a 12x14″ Risdon sinking engine. Plant includes 3 air-compressors, of 3,000, 4,000 and 5,000 cubic feet capacity, respectively. The largest electrical transformer station in Montana is planned for the Leonard plant.

The Pennsylvania mine has a 400′ shaft at the East Pennsylvania, and a

three-compartment 1,845′ shaft at the West Pennsylvania. Some trouble w occasioned, 1907, at the West Pennsylvania, by gases coming from the S Lawrence mine. The Pennsylvania is connected underground with the Mour ain View, St. Lawrence and Silver Bow No. 1 mines. The property h extensive stopes above the 600′ level, ore lying nearer surface than in mo of the Butte mines. The Butte Coalition owns 38% and the Boston & Mo tana owns 62% of the Pennsylvania mine. Surface equipment includes 2,00 ton ore bins, a 19x48″ A'lis hoist, operati g 2 double-deck cages, a 12x2 sinking engine and an Ingersoll-Sergeant air-compressor with 20x30″ stea cylinders and 30x24½″ air cylinders.

The Mountain View mine has a 1,851′ three-compartment shaft, and a 1,00 air-shaft. There are 15 exits, mine being connected underground with the Hi Ore mine of the Anaconda, for drainage. The Mountain View shows veins of 8′ to 60′ width, ore averaging about 5% in copper tenor, bei second only to the North Butte in richness in the Butte camp. Equipme includes 4,500-ton ore bins, a hoist good for 3,000′, a 12x14″ Risdon sinki engine and an Allis air-compressor with 20x24″ steam cylinders and 40x42″ cylinders.

The East Colusa mine has a 3-compartment 900′ shaft, with 4 undergrou connections with other mines. It is planned deepening this shaft to 1,20 property shows a vein of about 65′ width, assaying 3 to 4% copper, with strea ranging up to 12% in copper tenor. Equipment includes a 16x32″ Griffith Wedge hoist.

The West Colusa mine has a 3-compartment 1,800′ shaft. The West Col shows vein matter up to 400′ in width, at one point, and is timbered w 10x10″ and 12x12″ square sets. Considerable trouble was had, 1908, by ga from the fire in the Minnie Healy mine. Surface equipment includes a steel gallows-frame, a 20x60″ Nordberg hoist operating 2 single-deck cag and a 13x12″ Iron Bay sinking engine.

The Badger State mine, lying northwest of and adjoining the No Butte, and carrying the extension of the Edith May vein, formerly produ a little good ore from shallow workings, and is opened by a 4-compartm 530′ shaft, planned to be sunk 1,800′.

The Gambetta mine has 2 shafts, No. 1 being 300′ and No. 2 being 2 in depth.

The Moose mine has a 400′ shaft and is but slightly developed, hav been idle for several years.

The Greenleaf mine has a 1,000′ shaft, with hoist good for 2,500′. T property shows an 11′ ore body, having a southerly dip, with several promis streaks of copper ore. Work was suspended circa July, 1908.

The Comanche mine has been but slightly developed. There also numerous other properties, on which more or less exploratory work has b done at various times.

The leaching plant, costing about $20,000 and treating water from the mines of the company, is much the largest and best planned in the trict, including the usual launders and a building at the Leonard mine drying and shipping precipitates.

The works, at Great Falls, 171 miles from the mine, receive ore over Great Northern railway, at a freight charge of $1 per ton, high freights be offset by the advantage of water power obtainable at Great Falls. works were opened 1891, with a capacity of 1,000 tons, increased, 1903 to 2, tons, and later to 4,000 tons. It is planned to increase the capacity to 5, tons daily.

The concentrator, second only in size to the monstrous Washoe plant

the Anaconda, is in 6 sections, each a complete mill in itself, the 6 having a total capacity of 2,700 tons daily. The building, of wood, is equipped with six 10x20" and twelve 5x12" Blake crushers, 16 Huntington mills, 18 rolls, 317 sieves, 68 Harz jigs, 249 Evans jigs, 5 Overstrom tables, 42 Wilfley tables, 10 six-foot vanners and 50 four-foot vanners.

The smelter treats normally circa 400 tons daily of high grade ore, and the mill-product of 2,500 tons of concentrating ore. Equipment includes 22 McDougal calciners, five 500-ton water-jacket blast-furnaces, four 175-ton reverberatory furnaces, and a converter with 12 stands, having 84x170" shells, of the upright type. Product is blister copper of 99% tenor, including about 40 oz. silver and 0.25 oz. gold per ton.

A new smokestack, under construction, is the largest in the world, costing about $200,000. The new stack is set on a foundation 38' deep and 97' in diameter, composed of 10,000 tons of concrete. The stack is of 506' height, 74' outside diameter at the base and 50' inside diameter at the top, weighing 16,600 tons. Material of stack is perforated segmental brick, slightly shaped to fit the curvature of the stack, equvalent in contents to 5,700,000 common brick. The stack has a sectional lining, and is capable of carrying about 4,000,000 cubic feet of gases per minute, its capacity being equal to any possible increase in the works. A new flue, connecting the smelter and stack, has a 175'x125' dust-chamber and a 1,450' flue-section 48' wide and 28' high.

The electrolytic plant has a capacity of 70 tons of refined copper cathodes daily, gold and silver slimes being reduced in a separate refinery. Equipment includes 3 furnaces for melting cathodes and for casting refined copper into wire-bars and cakes. A considerable portion of the blister copper from the smelter is sent for refining to the Raritan works, at Perth Amboy, N. J. Current for the electrolytic tanks is carried by solid overlapping slabs of copper.

Power for the concentrator, smelter and electrolytic works at Great Falls is taken from the Black Eagle Falls of the Missouri river, this having a 42' effective head and generating 8,700 h. p., except at the lowest stage of water. There also is a 3,000-h. p. auxiliary steam plant. The power plant was practically ruined, June, 1908, by floods that caused the failure of the north wall, and was put out of commission for some months, while rebuilding, closing down the entire works.

The extensive litigation, 1899-1906, between the Boston & Montana and the Heinze interests, was ended February, 1906, by the formation of the Butte Coalition Mining Co., and the slate has been wiped clear of litigation.

The Boston & Montana employs normally about 4,000 men, of whom approximately 2,500 are at the mines and 1,500 at the works.

Production of the Boston & Montana is approximately 90,000,000 lbs. fine copper yearly, though materially less in 1907, owing to suspension on account of the low price of copper in 1907. For the Montana tax year, ending June 1, 1907, production was 1,156,785 tons of ore, yielding gross proceeds of $16,629,643, with net earnings of $7,049,888, while for the tax year ending June 1, 1908, production was 967,685 tons of ore with gross proceeds of $9,775,118 and net earnings of $1,561,061. Average cost of Butte & Montana copper is 10 to 10.5 cents per pound, after deducting included gold and silver values. The ore mined gives average returns of a little better than 4% copper, and about $1.60 per ton in combined gold and silver values. The property is one of the richest and largest copper mines in the world, and the management is excellent in all departments.

BOSTON-SIERRA MADRA MINE INDUSTRY CO. WYOMING.

Office: 1118-59 Clark St., Chicago, Ills. Mine office: Slater, Routt Co.,

Colo. Amos Pettibone, president; Dr. Daniel Pease, vice-president; Lew Pease, secretary, treasurer and general manager. Organized December, under laws of Wyoming, with capitalization $1,000,000, shares $1 par. A meeting, second Wednesday in January. Lands, 2 claims, patented, ar acres, in the Three Forks district of Carbon county, Wyoming, carryi fissure veins in andesite, opened by a 165′ shaft and several pits of 10′ t and a 407′ tunnel, with about 1,200′ of workings, showing cuprite, chalcop and argentiferous galena, in veins of 6″ to 30′ width, reported by com to carry small percentages in copper, about 15% lead, up to 60% zinc, 600 oz. silver, and from a trace to $1,400 gold per ton. Has several build Idle.

BOSTON & TINTIC MINING CO. U

Office: Herald Bldg., Salt Lake City, Utah. Mine office: Mam Juab Co., Utah. D. P. Rohlfing, chairman; C. E. Allen, vice president; W Tibbals, Jr., secretary; Wm. H. Tibbals, treasurer. Organized 1899, under of Utah, with capitalization $500,000, shares $1 par; issued, $472,000. L 3 claims, patented, area 41 acres, in the Tintic district, showing 2 f veins in porphyry, of which 1, of 3′ to 5′ average width, traceable circa 2 has been opened by tunnels of 70′, 120′ and 40′, and by a 240′ shaft, sho ore assaying 1 to 3% copper, 20 to 55% lead, 45 to 255 oz. silver an cents gold per ton. Idle since 1905.

BRIDGE CREEK MINING CO. WASHING

Mine office: Keller, Ferry Co., Wash. E. H. Arthur, president; Braley, secretary and treasurer; B. H. Wells, superintendent. Lands acres, on Bridge Creek, near the Congress mine, 14 miles north of K opened by a 246′ tunnel, said to show ore assaying $80 per ton in com copper, gold and silver values.

BOSTON & NEVADA COPPER CO. NEV

Dead. Organized Aug. 15, 1904, under laws of Maine. Lands sold to Nevada Consolidated Copper Co. Formerly at Ely, White Pine Co., Nev

BOSTON & NEVADA MINING CO. NEV

Dead. Property sold, 1906, to Nevada Copper Co. Formerly at Yerin Lyon Co., Nev.

BOSTON & NEW MEXICO COPPER CO. NEW ME

Office: 502 Colonial Bldg., Boston, Mass. John E. Kimball, presi Andrew Swanson, treasurer; C. J. Arthur, secretary and manager. O ized April, 1903, under laws of South Dakota with capitalization $20 Lands, sundry mining claims in Socorro county, New Mexico. Is a mere s jobbing scheme.

BOSTON & PIOCHE MINING & DEVELOPMENT CO. NEV

Office: Boston, Mass. Mine office: Pioche, Lincoln Co., Nev. C. S. ler, general manager. Land, 10 claims, lying to the eastward of the Ne Utah property, including the Fannie and Peavine mines, both small prod in the past. Development is by shaft. Presumably idle.

BOSTON & ST. MARY COPPER MINING CO.

Dead. Formerly had an office at Great Falls, Mont.

BOSTON-ST. PAUL CONSOLIDATED COPPER MINING CO. WASHING

Office: 712 St. Peter St., St. Paul, Minn. Letter returned unclaimed former mine office, Index, Snohomish Co., Wash. Wm. M. Baker, presi O. S. Derringer, secretary. Capitalization $2,000,000, shares $1 par. Lan claims, adjoining the Ethel. Idle for some years.

BOSTON & SEATTLE MINING CO. MONTA

Office: care of C. R. Tuttle, secretary, Cleveland, Ohio. Mine o

Elliston, Powell Co., Mont. A. J. Wheeler, president; Robt. I. McKay, treasurer. Lands, 11 claims, 4 patented, circa 12 miles from Elliston, said to show large bodies of low-grade ore, which might be worked advantageously only with railroad facilities, now lacking. Idle.

BOSTON & SEVEN DEVILS COPPER CO. **IDAHO.**

Dead. Formerly at Cuprum, Washington Co., Idaho. Described Vol. III.

BOSTON & SILVERTON MINING & REDUCTION CO. **COLORADO.**

Office: 39 Court St., Boston, Mass. Mine office: Silverton, San Juan Co., Colo. A. A. Lamont, superintendent. Lands, in Illinois Gulch, shortly north of Silverton, show auriferous and argentiferous lead and copper ores. Has steam power and a 10-stamp mill. Claimed too much in its literature offering stock and presumably is idle.

BOSTON TERRACE COPPER MINING CO. **UTAH.**

Office: 631-53 State St., Boston, Mass. H. T. Gerrish, treasurer. Organized under laws of Maine, with capitalization $500,000, shares $1 par; issued, $1,400,000. Lands, 11 claims, area 220 acres, in the Newfoundland district of Box Elder county, Utah, having about one-half mile of underground openings, including 10 shafts of 30′ to 285′ depth. Ores have assayed up to 27% copper, 18% lead, 86 oz. silver and $1.20 gold per ton. Idle.

BOSTON & TEXAS COPPER CO. **TEXAS.**

Office: 405 Tremont Bldg., Boston, Mass. Letter returned unclaimed from former mine office, Spalding, Archer Co., Texas. E. M. Low, president; Jas. M. Wheaton, secretary and treasurer. Organized 1898, under laws of Arizona, with capitalization $2,500,000, shares $10 par. Mortgaged for $25,000 and desirous of selling lands. Long idle and apparently moribund.

BOSTON & TEXAS COPPER MINING CO. **TEXAS.**

Dead. Was promoted, in 1898, by Chas. Denison, Hartford Trust Bldg., Hartford, Conn., who advertised it as another Calumet & Hecla.

BOSTON & UTAH COPPER CO. **UTAH.**

Office: 508 Tremont Bldg., Boston, Mass. Mine office: Castleton, Grand Co., Utah. L. Auerbach, president. Lands, 40 claims, area circa 700 acres, in the La Sal district, showing a vein of 700′ claimed width, traceable for more than 1 mile, claimed to have a 200′ hanging-wall paystreak averaging 6 to 10% copper, with workable values in the balance of the ledge. These figures are gross overstatements. Mine has about a dozen openings, ranging from shallow pits to a 285′ tunnel, all showing copper. A tunnel on the east side of the Copper Queen claim is said to show about 75′ of ore of 3% copper tenor.

BOSTON & WYOMING COPPER-GOLD CO. **WYOMING.**

Letter returned unclaimed from former office, Custer, S. D. Mine office: Westland, Laramie Co., Wyo. W. A. Nelson, president; John I. Hightower, vice-president and general manager; W. E. Benedict, secretary. Organized October, 1903, under laws of South Dakota, with capitalization $2,000,000, shares $1 par. Lands, 6 claims, area 120 acres, known as the Seldom Seen group, showing 3 fissure veins in granite-prophyry, giving assays of 5 to 7% copper, 6 oz. silver and $3 gold per ton, from cuprite, chalcocite, bornite, and chalcopyrite, with sulphide ores predominating. Idle.

BOSTON & WYOMING COPPER MINING CO. **WYOMING.**

Office: care of Col. Jas. A. Shinn, Leadville, Colo. Mine office: Tie Siding, Albany Co., Wyo. Organized January, 1903, with capitalization $500,000. Has a 100′ shaft, and at last accounts was developing in a small way, under bond and lease.

BOULDER COPPER MINING CO. **SOUTH DAKOTA.**

Dead. Formerly at Custer, Custer Co., S. D. Described Vol. VII.

BOULDER CREEK MINING CO. IDAH

Mine office: Mullan, Shoshone Co., Idaho. Lands are the Central gro about 1 mile from Mullan, having tunnels of 140′ and 400′, showing ore givi assays of 10 to 15% lead, with small copper and silver values. Prope considered promising.

BOULDER MINING CO. BRITISH COLUMBI

Office: Oshkosh, Wis. Lands are gold-copper claims in British Columb Presumably idle.

BOUNDARY FALLS SMELTER. BRITISH COLUMBI

Owned by Dominion Copper Co., Ltd.

SOCIÉTÉ DES MINES DU BOU-THALEB. ALGERI

Office: 27 Rue Lafitte, Paris, France. Mine office: Rovigo, Alger, Algeri Jules de Catelin, manager. Lands, 394 hectares, carrying copper, lead and zi sulphides.

BOX CANYON MINING CO. ARIZON

Dead. Organized, 1906, by John Fredericks and others, to develop a mi and build a 5-stamp mill on a property in Tombstone Cañon, near the Mode mine. Formerly at Bisbee, Cochise Co., Ariz.

BOZEMAN COPPER CO. MONTAN

Office: Bozeman, Mont. Organized August, 1904, with capitalizat $100,000. No traces of any operations.

BRADEN COPPER CO. CHI

Office: 71 Broadway, New York, N. Y. Mine office: La Junta, Ranca O'Higgins, Chile. Barton Sewall, president; Wm. Braden, general mana W. N. Burk, mine manager; E. K. McCann, superintendent; R. L. L metallurgist. Organized June 24, 1904, under laws of Maine, with capita tion $3,000,000, and name changed, August 9, 1904, to present title. Con is protocalized in Chile.

Lands, 15 claims, area 264 acres, located about 40 miles east of Ranc nearest seaport being Valparaiso, 200 miles distant by rail. Property in El Teniente, an antigua, in the Cordillera de Graneras, also the extensio El Teniente and the Capitana mines.

The ore body is unique, a volcanic vent of about 3 miles circumfe being filled with tuff and surrounded by highly fractured diorite, the fra being mineralized around the circumference. While the mineralization ex for a distance of about 1,000′ around the 3-mile circle, the commercial bodies in diorite are found within about 100′ of the contact, as a rule. dioritic zone has been fractured by porphyry dykes, which occasionally into the tuff. The zone of oxidation is shallow, ranging from a few feet 150′ in depth. The fractures in the rock range from a mere film of sulph up to 3″ to 4″ of mixed bornite and chalcopyrite, principally the latter.

The Teniente, which is the principal mine, as developed, was work by the Spaniards before the independence of Chile, and is said to have produc about 50,000 tons of ore of 30 to 50% average copper tenor. El Teniente developed at the point of contact of porphyry dykes and tuffs, having gangue of tuff and porphyry breccia seamed with native copper, cuprit azurite, malachite and tetrahedrite, latter predominating. The breccia porphyry and tuff has been claimed to somewhat resemble the Calumet co glomerate of the Calumet & Hecla, and both porphyry and tuff are slight mineralized for a considerable distance along the contact line.

The Fortuna mine was gophered extensively by former owners for hi grade ore, which was followed and extracted wherever found. The ore averag lower in grade than in the Teniente, underground workings showing copp sulphides and occasional metallic copper throughout the seams in diori

ciated contact material, for a depth of about 2,000'. No. 1 tunnel n extreme width of about 250' of ore, giving an average assay of copper. No. 2 tunnel shows an even larger ore body, and No. 3 is ed to show more ore than No. 2. The Fortuna mine also is estimated to 000,000 tons of ore developed, ranging in copper tenor from 3 to 4%.

e Capitana mine, in the Cañon Diablo, on the opposite side of the in to the Fortuna, has been developed through the Fortuna tunnels, at rable depth, and shows 15% ore in surface workings. El Soldado mine, ally undeveloped, has promising ore outcrops.

e plan of mining used calls for the extensive use of opencuts, ore being down to the tunnel level, this system of extraction requiring little

1,000-h. p. hydro-electric plant is fed by water brought by a flume ipe-line, and the cost of power for the first year of operation was under r h. p. year, not including interest and depreciation.

he property has a good equipment of mine buildings and necessary inery, the plan of mining followed not requiring heavy hoists. A 30-mile n road, costing about $175,000, was complete November, 1905, and over about 4,000 tons of machinery and supplies were hauled in, as many as draft oxen being used. A railroad line is under construction to the port an Antonio, 150 miles from the mines, of which 40 miles, from Rancagua a Junta, is being built by the company. This line, of 32" gauge, costing t $400,000, will give reasonably cheap freight rates on supplies and copper put.

Ore is transported from mines to mill by 3 Riblet aerial trams. The main , 2,000 meters, runs from the mill to the central transfer station, where nection is had with a 1,000-meter line to El Teniente mine and a 500-meter to La Fortuna mine. The tramways are of 1,000 tons aggregate daily acity.

The 250-ton mill, planned as the first unit of a 500-ton mill, which went commission June, 1906, is thoroughly modern in design and equipment, ing Hartz jigs, Overstrom and Wilfley tables, Frue venners and Wilfley ers, and using the Sherman system for settling slimes. The mill puts about into I, treating ore averaging 3.5% copper and securing an average extrac- of about 70%, producing concentrates averaging about 25% in copper r. The company plans eventually treating 1,000 tons of ore daily, and ucing 12,000,000 to 15,000,000 lbs. fine copper yearly. Production, 1907, about 3,500 tons of concentrates, equivalent to 1,750,000 lbs. fine copper. ompany plans to produce copper for about 6 cents per pound, but will do if it can produce at an average price of 8 to 9 cents per pound. The prop- s one of exceptional promise and is under good management.

LEY MINING & MILLING CO. **WYOMING.**

ine office: Centennial, Albany Co., Wyo. Lands, sundry claims on an Hill, near Centennial, developed by a tunnel being driven to reach a of auriferous copper ore, claimed to carry average values of $35 per ton.

FORD COPPER MINING CO. **ARIZONA.**

ine office: Patagonia, Santa Cruz Co., Ariz. Idle.

FORD DEVELOPMENT CO. **ARIZONA.**

ad. Formerly at Vail, Pima Co., Ariz. Fully described Vol. V.

HAW MINING CO. **ARIZONA.**

ice: 327 New York Life Bldg., Chicago, Ills. Mine office: Briggs, Yava- , Ariz. Samuel B. Willey, president; Davis Ewing, secretary and r; Frank T. Day, manager; E. W. Fisher, general superintendent; oberts, superintendent. Organized 1904, under laws of Arizona, with

capitalization $2,000,000, shares $1 par. Property is leased to North Americ Exploitation Co. Lands, 23 claims, area 400 acres, also a 40-acre mill site the Castle Creek district, showing contact veins of 30′ to 100′ width, betwe granite and porphyry, carrying galena, cuprite, melaconite and malachite, sa to give assays of 15% copper, 20 to 40% lead, and $6 to $10 gold per to opened by shafts of 150′ and 300′ and tunnels of 150′, 80′ and 60′, est mated by management to show 6,000 tons of ore, with 4,000 tons blocked o for stoping. Apparently idle, and management is regarded with suspicion.

BRADSHAW MOUNTAIN COPPER MINING & SMELTING CO. ARIZON

Dead. Lands now held by De Soto Mining Co. Formerly at Humbol Yavapai Co., Ariz. Fully described Vol. V.

BRAGANZA GOLD MINING CO. ARIZON

Office: 708-140 Dearborn St., Chicago, Ills. Mine office: Big Bug, Yava Co., Ariz. J. N. Nichols, superintendent. Property is the Henrietta mi carrying auriferous copper ores, the Henrietta Cyaniding & Developing having been organized to treat sulphide ores from this mine, but the proc proved unsuccessful. Company was promoted by J. C. Rankin, and at time paid 1% monthly dividends, but it is doubtful if same were earn Idle and presumably moribund.

NEGOCIACION MINERA DE O. y T. BRANIFF y CA. MEXI

Office: Rosales 1, Mexico, D. F. Mine office: Cadereyta, Queretaro, M Thos. D. Murphy, general manager; Walter Neal, mine superintendent. La include El Doctor and La Negra mines, carrying mainly silver-lead ores, w small copper values and considerable zinc. Has electric power and a 160- mill having 5 stamps and Huntington mills. Also has a 125-ton cyanide pl and a 40-ton smelter, employing circa 250 men.

BREBO COPPER, SILVER & LEAD MINING CO., N. L. AUSTRALI

Office: Goulburn, N. S. W., Australia. Mine office: Brebo, N. S. W Australia. W. H. Bladwell, chairman; J. N. Hay, legal manager. Lan sundry claims 4 miles from Brebo, the nearest railway station, opened by a shaft. Was developing, with a small force, at last accounts.

GEWERKSCHAFT GRUBE BRICCIUS-STOLLN. GERMAN

Mine office: Annaberg, Saxony, Germany. E. R. Poller, manager. H argentiferous copper and zinc ores. Idle for several years.

BRIGGS-OLIVER DEVELOPMENT CO. NEW MEXIC

Mine office: Lordsburg, Grant Co., N. M. Lands, known as the Burro Ch property, lying west of the Copper Gulf, have 3-compartment and 2-co partment shafts, all shallow.

GEWERKSCHAFT BRIGITTA ERZBERGWERK. GERMAN

Dead. Formerly at Sennheim, Elsass, Germany.

BRINDLE PUP MINING CO. ARIZON

Dead. Formerly at Dewey, Yavapai Co., Ariz.

FÉLIX BRIONES. MEXIC

Mine office: Topia, Tamazula, Durango, Mex. Has silver and copper o employing about 30 men at last accounts.

BRISTOL CONSOLIDATED MINES & SMELTING CO. NEVA

Letter returned unclaimed from former office, 31 Nassau St., New Yo N. Y. Mine office: Pioche, Lincoln Co., Nev. F. L. Underwood, president a treasurer; preceding officer, E. V. Van Orden, W. A. Smith, Wm. Gelder a E. F. Freudenthal, directors. Organized June 4, 1906, under laws of Arizo with capitalization $400,000, as successor of the Bristol Copper Mining Is said to be controlled by the California-Nevada Copper Co. Lands, 20 clai area 400 acres, and an 80-acre millsite. Mine has about 2 miles of workin Ore shipped previous to the completion of railroad to Pioche, 1907, assayed

in 30% copper and about 10 oz. silver per ton, but the average grade of ore extracted is considerably lower, low grade ore having been held for completion of railroad. Has 2 hoists, 2 air-compressors and an electric light plant.

BRISTOL COPPER MINING CO. **NEVADA.**

Dead. Merged June 4, 1906, in Bristol Consolidated Mines & Smelting Co. Formerly at Pioche, Lincoln Co., Nev. Described Vol. VI.

BRISTOL MINE. **CONNECTICUT.**

Mine office: Bristol, Hartford Co., Conn. Was worked 1847-1854, yielding about $200,000 worth of chalcocite, bornite and chalcopyrite. Idle many years, filled with water, and mine machinery at bottom of shaft.

BRITANNIA COPPER MINE, LTD.

Dead. Formerly had an office at 4 Bishopsgate St., London, E. C., Eng.

BRITANNIA COPPER SYNDICATE, LTD. **BRITISH COLUMBIA.**

Dead. Merged, 1908, in Britannia Smelting Co., Ltd. Formerly at Howe Sound, New Westminster district, B. C. Fully described Vol. VII.

BRITANNIA MINING CO. **MONTANA.**

Office: 219 Germania Bldg., Milwaukee, Wis. Letter returned unclaimed from former mine office, Butte, Silver Bow Co., Mont. G. R. Nickey, president and general manager; G. R. Best, secretary and treasurer. Organized Sept. 25, 1902, under laws of Wisconsin; capitalization increased, Mar. 2, 1898, to $150,000, shares $1 par. Has paid dividends of $42,000. Lands, one patented claim, area 13 acres, showing 6 veins, of which 3 parallel veins, of 3' to 30' width, are developed by shafts of 100', 150' and 400', with circa 1,000' of underground openings, showing ore claimed to give average values of about $5 per ton, mainly in silver. Idle and presumably moribund.

BRITANNIA SMELTING CO., LTD. **BRITISH COLUMBIA.**

Office: 31 Davis Chambers, Vancouver, B. C. Mine office: Howe Sound, New Westminster district, B. C. Works office: Crofton, Vancouver Island, B. C. Hon. Edgar E. Dewdney, president; Mason T. Adams, vice-president and managing director; J. W. Lee, secretary and treasurer; preceding officers, D. G. Marshall and C. B. McNeill, directors; R. H. Leach, superintendent Britannia mine; W. C. Freeburn, superintendent Mount Andrew mine; S. S. Raymond, smelter superintendent; H. C. Bellinger, consulting engineer; L. E. Gooding, metallurgist; W. H. Yost, master mechanic.

Organized 1905, under laws of British Columbia, with capitalization $625,000, shares $25 par, later increased to $2,500,000, shares $25 par; issued, $2,207,000. Acquired, 1908, property of the Britannia Copper Syndicate, Ltd. Annual meeting, first Tuesday in March.

Property includes the Britannia mine, at Howe Sound, owned outright, and the Mount Andrew mine, at Ketchikan, Alaska, held under lease, a 5-acre smelter site and 3 townsites.

The Britannia mine, 7 claims, crown-granted, area 297 acres, lies on Britannia Mountain, 4 miles from and about 3,500' above the sea, carrying approximately 8,500' of the strike of a mammoth mineral zone, ore-body consisting of mineralized schist in lenses and large irregular bodies, ranging 300' to 600' in width, the schistose silicious material being impregnated with copper and iron pyrites. Considerable diamond drilling was done, 1907. There are 8 known ore bodies, of which 3, developed, carry an average of about 2.5% copper, 0.04 oz. silver and 50 to 80 cents gold per ton. Climate is favorable, and owing to immense width of the ore body, mine can be worked open-cast for many years. Development is by large glory-holes, and by tunnels of 300', 200', 1,000', 1,500' and 300', with about 8,000' of workings, estimated to show 2,000,000 tons of ore, with about 500,000 tons blocked out for stoping. Principal tunnels are the Big Bluff and Jane, latter, which is the main operat-

ing tunnel, having a 600′ trestle with 10-ton self-dumping cars and an au matic incline railroad. The Big Bluff tunnel has a 640′ trestle with 10-ton s dumping cars, and a gasoline locomotive. At the mine are Blake crush that pass crushed ore to a sorting-belt, thence to a 1,000-ton receiving b whence ore is taken by a 16,900′ aerial tram in 2 sections, the upper of 5,5 and the lower of 11,100′, with an intermediate transfer station. The tra is rated at about 300 tons daily capacity, but has given some trouble operation. The upper section has a drop of 1,400′ and the lower a drop 1,800′.

Equipment includes 300 h. p. in steam, 400 h. p. in water and 500 h. p. electric energy. A 35-drill Rand air-compressor, at the beach, sends air to th mine through an 18″ pipe line. There is a 3-mile transmission line, with tw 300-kw., 6,600-volt generators, driving the machinery plant at the mine, actu ated by a Pelton water wheel, located at the beach, which receives water fro a creek under an effective head of about 1,900′. At the beach there is a 250′ wharf with a 90′ wing for receipt of mine supplies and shipment o concentrates.

The 300-ton concentrator, 125x133′ in size, of wood, has 2 Blake crushers 3 Chilean mills, 4 rolls, 34 Harz jigs, 1 Hancock jig, 2 Cammett concentrator 11 Wilfley tables, 11 Overstrom tables, 10 Johnson vanners and 22 Fr vanners. Mill was remodeled, 1907, changing its method from fine to coar crushing, some trouble having been experienced in concentration under th fine crushing system. Buildings include a 40x80′ wooden machine-ship, sa mill, school and store, with about 50 dwellings and miscellaneous buildings.

The Mount Andrew mine, operated under lease, is separately described.

The smelter, built 1902, by the Southwestern Smelting & Refining Co., located on the eastern coast of Vancouver Island, about 50 miles from V toria, with which there is rail and water connection, and receives ore by wa from the Britannia mine, 60 miles distant, the works being well located the receipt and treatment of coast and Alaskan ores. Ore is received from Britannia in railway cars, loaded on barges, at a 750′ wharf having 21′ of c water, and cars are hauled up incline trestles to six 300-ton receiving b There also are eight 300-ton storage-bins, with room for additional bins, bins having automatic discharge gates.

The sampling mill, 26x32′ on the ground and 84′ high, has two 10× Blake crushers, 1 pair of Davis 12x13″ crushing rolls, Constand automa sampler and a Coolidge sampler, with a 45-h. p. engine.

The furnace building, 45x75′, has two 250-ton water-jacket blast-furnac The dust-flue is 10x12x200′, with a 24x40′ dust-chamber, connecting wit circular brick stack 12′ in diameter and 120′ high, on a concrete base. Sla granulated and dumped by bucket elevator.

The converter building, 65x73′, has 1 hydraulic stand and four 84x shells, of trough type. Molten matte runs from settlers to converters launder, and converter fumes pass through a steel flue into a dust-cham having water sprays. The converter department has a silica mill, with p matic tamper run by a small air-compressor. Product is a blister copper 99.5% tenor, carrying 12 oz. silver and 2 oz. gold per ton, sent to the Un States refinery at Chrome, N. J., for electrolytic treatment.

The briquetting plant is housed in a 35x73′ building with 78x104′ drys Equipment includes a No. 7 Chambers briquetting machine and 2 Scott vating brick-cars, with steam coils in the loft of the dry-shed. Briquettes roasted with raw ore.

The power building is 50x60′, with blower-room 40x50′, and boiler-ho 40x48′, housing three 140-h. p. boilers. The power plant has a 110-kw. W

se current generator, air-compressor for convertor blast, and Nos. 5 and nersville blowers, connected with a 54" blast-pipe, leading to the furnace, rs having a united capacity of 9,000 cubic feet of free air per minute. melter fuel is coal and coke, amounting to about 6,000 tons of coal 0,000 tons of coke yearly. Owing to local shortage, 1907, some coke was rted from New Zealand. The smelter does practically no custom business. Miscellaneous buildings include a well constructed office, assay office and all but complete machine-shop. The smelter plant is lighted throughout by ricity.

The company employs, normally, about 300 men, but operations were sus- ded October, 1907, owing to the low price of copper, coupled with necessity reconstructing the concentrator. The mill was started, on a test run, e, 1908. Production, 1906, was 4,409,650 lbs. fine copper, 38,265 oz. silver 5,261 oz. gold. In 1907 about 65,922 tons of ore were treated, yielding 1,410 lbs. fine copper, of which the Britannia mine furnished 1,706,734 lbs. e Britannia has been very thoroughly developed and equipped, but to date s proven somewhat disappointing. The management is good, however, and h changes made in the milling system, should obtain better results in the ure than have been secured in the past.

ITANNIA WEST COPPER CO., LTD. **BRITISH COLUMBIA.**

Mine office: Howe Sound, New Westminster district, B. C. Thos. Gibson, e manager. Organized 1906. Is said to have paid $250,000 for lands, which e on Howe Sound, opposite the Britannia, and were known formerly as the ilery or Twentieth Century group. Lands have an available water power. ving heard of company since shortly after organization, and presumably unbound.

ITISH AMERICAN COPPER MINES & SMELTER CO. **BRITISH COLUMBIA.**

Office: Williamson Bldg., Cleveland, Ohio. Chas. H. Tucker, president; A. C. Kernohan, vice-president; C. H. Taylor, treasurer; Thos. G. Selleck, secretary; Francis J. Peck, consulting engineer. Organized Aug. 15, 1906, with capitalization $5,000,000, shares $1 par. Lands, 10 claims, area circa 500 acres, held by location, on Warren Creek, a tributary of Wells Creek, which is a tributary of the Similkameen river, which is a tributary of the Columbia river. Lands are 43 miles from Golden and 10 miles from Wells Landing, and instead of neighboring the Granby, as advertised, are distant about 300 miles, in an air-line, from the Granby. Lands, well watered and timbered, are in a very rugged country, showing strong outcrops. Company claimed, in its advertisements to have a 16′ vein, and to have "contracted for" 1,000′ of tunnel, which would "block out ready for mining," $10,575,000 worth of high grade copper ore, which, of course, is a downright lie. Company claims to have a practically inexhaustible body of ore assaying 7% copper, "at a conservative figure," which happens to be an exceedingly reckless figure. Mr. Kernohan, the promoter, stated, 1907, that he had examined this property, and reported that "2 tunnels, one 750′ and one 250′, with shaft connecting, block out $10,000,000 worth of ore, if half the values continue in the 16′ vein." There being no evidences of either tunnels or shaft, this statement carries its own refutation. The company's advertising and literature state that a 10-mile wagon road will give an outlet to the Kootenai Central Railroad, but unfortunately the Kootenai Central has not yet materialized beyond the point of 10 miles of grading, and there is no railroad within 100 miles of the company's mines, neither is there wagon road or river transportation, and the total copper production of the entire district was valued at $1,654 in 1905. Statements of the company in its advertising that this is the richest copper district

in the world, and that the mine would begin shipping ore at once, deliberate and intentional lies. The company must be regarded as a swindl

BRITISH AMERICAN GOLD & COPPER MINING CO. SOUTH DAK

Office: 70 Grand River Ave., Detroit, Mich. Letter returned unclai from former mine office, Deadwood, Lawrence Co., S. D.

BRITISH & COLONIAL ESTATES, LTD. AUSTRA

Office: 4 Broad Street Place, London, E. C., England. Isaac Smith, ch man; Wm. Bourne, managing director; Jos. Phillips, secretary. Organized J 12, 1895, under laws of Great Britain, with capitalization £150,000, shares par. Property includes the Infirtaris and Belara copper mines, in New So Wales, and sundry other interests. Mines are idle.

BRITISH COLUMBIA AGENCY, LTD. BRITISH COLUMB

Dead. Formerly at Alberni, Vancouver Island, B. C.

BRITISH COLUMBIA CHARTERED CO. BRITISH COLUMB

Dead. Property was the B. C. mine., now owned by British Colum Copper Co., Ltd. Formerly at Summit, Boundary district, B. C. Descrit Vol. VI.

BRITISH COLUMBIA COPPER CO., LTD. BRITISH COLUMBIA & WASHINGTO

Office: 814-31 Nassau St., New York, N. Y. Mine and works office: Gre wood, Boundary district, B. C. Newman Erb, president; F. L. Sommer, vi president; preceding officers, F. L. Underwood, Copley Amory, Anthony Brady, Colgate Hoyt, Edwin Hawley, C. E. Laidlaw, Josiah C. Reiff and C. Starbuck, directors; R. H. Eggleston, secretary and treasurer; J. E. McAllis general manager; Frederick Keffer, engineer; M. D. McIntosh, P. W. Lover H. Johns, mine superintendents; W. C. N. Wilson, cashier.

Organized March, 1898, under laws of West Virginia, with capitaliza $2,000,000, increased, 1907, to $3,000,000, shares $5 par; issued, $2,515, Paid first dividend, 40 cents per share, $201,200, Sept. 4, 1907. Company about 1,375 shareholders. Annual meeting, second Tuesday in February. York Trust Co., registrar and transfer agent. Metropolitan Audit Co., aud

Lands are extensive, including various mining groups in the Boundary trict of British Columbia, and in the adjoining state of Washington, a 60-acre millsite. The principal mines are the Motherlode and adjoining p erties, in the Deadwood camp, which have large and strong ore bodies are slightly lower in average grade than the Granby. The mines use a 1,800 h. p., mainly electrical.

The Motherlode group, area 180 acres, has 5 ore bodies, of which 3 developed, occurring as contact deposits between limestone and eruptive d Ore is exclusively auriferous and argentiferous chalcopyrite, occurring silicious and calcareous gangue, or in magnetite. The ore bodies are irre in occurrence, the main vein ranging 80′ to 150′ in width, and is prover surface trenching and natural exposure, for a length of 1,800′. Ore a about 1.5% copper, 0.2 to 0.5 oz. silver and $1 to $2 gold per ton. U ground workings are about 3 miles, disclosing at least 3,000,000 tons of with about 1,000,000 tons blocked out for stoping. Development is by a four-compartment shaft, with 3 tunnels, latter connected with surface upraises, of 200′ average height, these reaching quarries on surface, ore b milled through the upraises to tram-cars in the tunnels. Main tunnel double tracks, equipped with 3-ton tram cars. At the portal of the tu there are 24x36″ and 36x42″ Farrel crushers. Equipment at the Mother includes a 500-h. p. steam plant, but electric power is used mainly throug the mine and on surface. Machinery includes two 35-drill Rand-Corliss du tandem air-compressors, driven by a 500-h. p. Canadian General Electric m

ngs at the Motherlode include a 30x50′ carpenter-shop, 30x70′ machine-17 other mine buildings and 20 dwellings for employes.

No. 7 mine, adjoining the Motherlode, has a continuation of the latter's ody, with a 300′ main shaft and about a mile of workings.

The Oro Denoro mine, 4 claims, area 180 acres, bought June, 1906, adjoins Emma and British Columbia mines, showing 3 ore bodies, of 20′ to 120′ h, carrying auriferous and argentiferous chalcopyrite, associated with te, with silicious and calcareous gangue, being valuable for fluxing, owing xcess of both iron and lime. New ore bodies were proven, 1907, by diamond borings. Mine has a 190′ shaft and 3 tunnels, but is worked largely open-

The British Columbia mine, about a mile from the Emma, held formerly the British Columbia Chartered Co., consists of 11 claims, 3 fractional, eloped by about 2 miles of workings, showing argentiferous and slightly riferous chalcopyrite, similar to the ore of the Oro Denoro and Emma. uipment includes a 225-h. p. steam plant, with 4-drill Rand and 5-drill ersoll-Sergeant air-compressors.

The Emma mine, adjoining the British Columbia and Oro Denoro, is ned three-fourths by the British Columbia Copper Co., Ltd. and one-fourth y the Hall Mining & Smelting Co., but is operated by the British Columbia. The incline shaft is 252′ deep, ore being much the same as at the Oro Denoro. Electric power has been substituted for steam, equipment including a 200-h. p. Westinghouse motor, 8x10″ Lidgerwood hoist and a 1,400′ Rand air-compressor.

The Sunset group, at Princeton, B. C., on Copper Mountain, in the Similkameen district, has low grade copper ore, high in silica and low in iron.

The Napoleon mine, in the Pierre Lake district, near Marcus, Stevens Co., Wash., consists of 46 claims, bought for $60,000. Ores are low in copper ent, but carry good gold values. Property has a rock-crusher and aerial am, and installation of a cyanide plant, to treat gold ores, is under nsideration.

The Lone Star mine, also in Washington, shipped, 1907, circa 1,500 tons of gh grade copper ore, secured from development, and is considered a promising operty.

The Apex group of 11 claims, and the Gloucester group of 3 claims, in the vicinity of Chesaw, Okanogan Co., Wash., are in the development stage.

The smelter, at Greenwood, 5 miles from the Motherlode mines, receiving re therefrom over the Canadian Pacific railway, does a general custom busi-ess. Motive power is electric energy, taken from Bonnington Falls, normal requirements being circa 1,600 h. p. All buildings are of steel, and the plant, remodeled, 1907, is of about 2,000 tons daily capacity.

The bins at the works have capacity for 12,000 tons of ore and 2,000 ns of coke. A 600-ton sampling mill, 65x79′ and 3 stories high, has a custom-re bin, connected with the sampler ore bins by a belt-conveyor.

The blast furnace building has 3 new 700-ton blast-furnaces, each 60x240″ at the tuyeres. A 12x14x620′ dust-flue leads to a 121′ stack. There are five 15-ton Baldwin-Westinghouse electric locomotives, 3 for charging and miscellaneous purposes and 2 for the slag line, latter having 25-ton side-dump-ing ladle-cars, each with an electric motor having a worm gear for tilting and dumping, operated from the locomotive.

The converter building, 45x90′, of steel, adjoining the blast furnace build-ing, has 2 stands, with 84x126″ horizontal shells, taking matte of 15 to 55% copper tenor, and producing blister copper of 99.3% tenor, carrying 20 to 50 oz. silver and 10 to 25 oz. gold per ton, sent to the United States Metals Refining Co., at Chrome, N. J., for electrolysis. Stands are tilted by hydraulic

accumulators, and shells are handled by a 40-ton 4-motor traveling cr
The converter department has a 72″ silica-mill for linings.

The power-house, 40x81′, has three 100-h. p. boilers and a 150-h.
Reynolds-Corliss engine, held in reserve for emergencies, electric power be
used throughout the works. Equipment includes three 300′ Connersv
blowers, each belted to a 300-h. p. induction motor. There also is a Nordb
air-compressor, operated by a 300-h. p. induction motor.

The works have a briquetting plant handling flue dust. Smelting fuel
coke, costing $6.50 per ton, consumption being circa 90,000 tons yearly.

The works include a machine-shop and several other buildings. The pla
is protected by a complete water system, having hydrants at frequent interva
About 600 men are employed at the mines and works.

The company's balance sheet of November 30, 1907, showed cash a
accounts receivable, $338,645.87, with current liabilities of $268,844.40. Pr
duction, 1905, was 5,601,309 lbs. fine copper, 95,410 oz. silver and 26,226
gold; production, 1906, was 5,820,651 lbs. fine copper, 82,193 oz. silver a
20,238 oz. gold, while for 1907 production was 8,519,502 lbs. fine copper, secur
from 242,788 tons of ore smelted, of which the Emma mine produced 18,3
tons, the Oro Denoro 14,480 tons, and the British Columbia 1,712 tons. O
are slightly lower in average grade than those of the Granby, returning fr
the smelter an average of 21 lbs. copper and $1.25 per ton in combined gold a
silver values. Smelter costs, 1907, were $1.18 per ton. For fiscal year end
Nov. 30, 1907, costs were about 13 cents per pound for fine copper, but sho
be much smaller on the larger tonnage since secured, and for June, 1908, c
were said to have been only 9.79 cents per pound. The mine has an imme
tonnage of assured ore, and while the ore is low in average tenor, it can
mined and smelted at unusually low costs. The management is good, and
property has been carefully developed, to the present point of assured p
ductive capacity, with excellent prospects for the future.

BRITISH COLUMBIA EXPLORATION, LTD. BRITISH COLUMB

Dead. Succeeded, Jan. 15, 1904, by Kamloops Mines, Ltd. Formerly
Kamloops, Yale district, B. C.

BRITISH COLUMBIA & LAKE SHORE COPPER CO., LTD. BRITISH COLUMB

Dead. Formerly at Summit, Yale district, B. C.

BRITISH COPPER SYNDICATE, LTD.

Office: 16 St. Helens Place, London, E. C., Eng. Organized Nov. 9,
under laws of Great Britain, with capitalization £500, shares £1 par.

BRITISH SOUTH AFRICA CO. RHODE

Office: 2 London Wall Bldgs., London, E. C., Eng. This great co
tion owns sundry copper fields of promise in northern Rhodesia, whic
developed to the point of actual exploitation, are set aside as subsidiary
panies. Owns a 35% interest in the Kansanshi mine, 65% belonging to
ganyika Concessions, Ltd.

BRITT COPPER CO. ARIZ

Office: care of A. T. Hammons, Globe, Gila Co., Ariz. Mine office
Thomas, Graham Co., Ariz. Organized Feb. 11, 1907, under laws of Ar
with capitalization $1,250,000, shares $10 par. Lands, sundry claims i
Aravaipa district, circa 25 miles from Ft. Thomas, said to give an encour
surface showing of copper ore.

K. K. BERG- UND HÜTTENVERWALTUNG BRIXLEGG. AUST

Mine office: Brixlegg, Tyrol, Austria. Gustav Kroupa, general man
Vincens Svoboda, superintendent and mining engineer; Cayetan Hu
smelter superintendent; Josef Link, purchasing agent. Mining lands,

ares. Ores are argentiferous and slightly auriferous copper sulphides. at Brixlegg, has blast and reverberatory furnaces for smelting, also and anode furnaces and a small electrolytic plant, having 60 tanks, ltiple arrangement of electrodes, treating black copper of about 90% tenor. Annual production averages about 5 kgs. gold, 600 kgs. silver, 000 kgs. fine copper.

N HILL PROPRIETARY CO., LTD. **AUSTRALIA.**

o longer a copper producer. Described Vol. V.

DE COPPER CO. **NEW MEXICO.**

d. Formerly at Tusas, Rio Arriba Co., N. M.

DE COPPER & GOLD MINING CO. **NEW MEXICO.**

d. Lost lands circa 1904. Foundry at Tusas, Rio Arriba Co., N. M.

DE COPPER MINING CO. **NEW MEXICO.**

ice: Bloomsburg, Pa. Mine office: Tusas, Rio Arriba Co., N. M. Lands, ms, including the Pay Roll mine, opened to depth of 250′, showing ous copper sulphides of good average tenor.

AÑIA ESPLOTADORA LOS BRONCES. **CHILE.**

ne office: Los Condes, Santiago, Chile. Has a long tunnel, driven in tion with Francisco de P. Perez. Ore is shipped to the Maitenes smelter luction. Production, 1903, was circa 400,000 pounds fine copper.

DAD MINERA DE LOS BRONCES. **CHILE.**

fice and mine: La Serena, Coquimbo, Chile. Organized Apr. 12, 1902, laws of Chile, with capitalization 60,000 pesos, shares 250 pesos par. nably idle.

KLYN-ARIZONA COPPER CO. **ARIZONA.**

ffice: 2 Kilby St., Boston, Mass. Mine office: Mayer, Yavapai Co., Dr. S. P. Smith, president; Calvin Cruchet, secretary; F. E. Small, urer. Organized under laws of Maine, with capitalization $2,500,000, $25 par. Was promoted by the American Securities Co., of which Small s treasurer. Lands, 14 claims, known as the Brooklyn group, in the district, circa 20 miles east of Mayer, opened by a 70′ three-compart- shaft, said to show ore assaying 10% copper, 12 oz. silver and $9.50 gold on. Mine is claimed to have $5,000,000 worth of ore in sight, which is redited. Has a 12-drill air-compressor. Property considered promising.

OKLYN COPPER & GOLD MINING CO. **WASHINGTON.**

Dead. Formerly claimed lands in the Colville Reserve, Stevens Co., Wash.

OKLYN MINING CO. **CALIFORNIA.**

Mine office: Dale, San Bernardino Co., Cal. H. H. Ames, superintendent carry gold and copper. Has gasoline power and a 3-stamp mill. Idle.

OKLYN MINING CO. **COLORADO.**

Mine office: Silverton, San Juan Co., Colo. Ores carry gold, silver and er. Has steam power and a 10-stamp mill. Presumably idle.

OKLYN MINING CO. **NEVADA.**

Mine office: Contact, Elko Co., Nev. Has gasoline power. Long idle.

OKS CONSOLIDATED COPPER CO. **MEXICO.**

Office: Bisbee, Ariz. Mine office: Fronteras, Arizpe, Sonora, Mex. Clin W. Moon, president; G. O. Schaecker, secretary and treasurer; George superintendent. Organized Jan. 25, 1906, under laws of Arizona, with alization $1,000,000, shares $1 par, as a reconstruction of the Cochise ecting, Mining & Development Co. Lands, 3 groups, area 620 acres, in ordillo district of the Ajo Mountains, 40 miles northeast of La Cananea. lopment is by open-cuts, pits, and a 425′ tunnel, showing oxide, carbonate ulphide ores, latter predominating, ores being estimated to average 8.75%

copper, 4% zinc, 12 oz. silver and $5 gold per ton. Vein is very strong, ran 50′ to 60′ in width, and traceable 1½ miles. Property is considered promis

BROOKSHIRE MINING CO. ARIZO

Mine office: Mayer, Yavapai Co., Ariz. Organized January, 1900, u laws of West Virginia, with capitalization $100,000. Is controlled thro ownership of 80% of stock, by the George A. Treadwell Mining Co., a notor swindle. Mine, 4 miles south of Jerome, has been idle since 1905.

BROUGHTON COPPER CO., LTD. ENGLA

Works office: Widnes, Lancashire, Eng. Property is a copper reduct plant.

BROWHEAD COPPER MINES. IRELA

Office: 7 Tower Bldgs. North, Water St., Liverpool, Eng. R. Shackl liquidator. Was organized June 30, 1906, under laws of Great Britain, w capitalization £65,000, shares £1 par, to take over a mining property known the Crookhaven Estate, area 3,135 acres, situated in the northern part County Cork, Ireland, but did not buy the property, and on September 1906, resolved to liquidate voluntarily.

BROWN-ALASKA COPPER CO. ALASKA & BRITISH COLUMB

Office: 1201 Alaska Bldg., Seattle, Wash. Mine offices: Coppermou Prince of Wales Island, Alaska, and Port Simpson, Skeena division, B. G. D. Mumford, president; Maurice D. Leehey, secretary; N. O. Lawton, m ager Mamie mine; Arthur A. Wakefield, manager Maple Bay mine. Capital tion $1,000,000, shares $1 par.

The Mamie mine, at Coppermount, has an ore body of about 40′ wi said to give average assays of 6% copper and $1 per ton in combined g and silver values. Ore is chiefly chalcopyrite, associated with pyrite pyrrhotite, occurring in lenticular bodies connected by thin seams. Early the Mamie was shipping circa 1,500 tons monthly.

The Maple Bay group, 14 claims, partly fractional, northeast of M Bay, in the Portland Canal district, includes the Maple Bay or Outsiders Blue Bell, Regina and Copper Queen mines. The Regina and Copper Qu opened by 3 tunnels, longest 300′, show a vein of 5′ to 14′ width, carr disseminated chalcopyrite averaging about 3% copper. Production of Maple Bay group, 1906, was 293,269 lbs. fine copper, and the group was March, 1907, to be shipping, circa 2,200 tons monthly.

Normal forces are about 40 men at the Mamie and 60 men at the M Bay, ore going to the Alaska Smelting & Refining Co., commonly known a Brown-Alaska smelter.

BROWN-ALASKA SMELTER. ALA

Owned by Alaska Smelting & Refining Co.

BRUCE & CHESSOR MINING CO. BOLI

Mine office: Oruro, Bolivia. Has steam power and employed abou men at last accounts, producing native copper from conglomerate strata.

BRUCE COPPER MINES, LTD. ONTA

Dead. Voluntarily liquidated May, 1902. Lands are now held by Co Mining & Smelting Co. of Ontario, Ltd. Formerly at Bruce Mines, Alg Ont.

BRUCE MINING CO. IDA

Mine office: Junction, Lemhi Co., Idaho. A. T. Bruce, general mana at last accounts. Has copper-gold ores, opened by tunnel. Presumably idle

BRUGER y CA. BOLI

Office and mine: Toledo, La Paz, Bolivia. Has steam power and firm small copper producer.

BRUNSWICK MINING & MILLING CO. **COLORADO.**

Mine office: Tin Cup, Gunnison Co., Colo. A. Lejune, superintendent. Property is the Jimmy Mack mine, producing gold, silver and copper. Has steam power and a 100-ton concentrator. Employs circa 20 men.

BRUSTAD MINES, LTD. **NORWAY.**

Office: 62 London Wall, London, E. C., Eng. Mine office: Eidsvold, Hedemarken, Norway. G. T. Broadbridge, secretary. Organized Feb. 11, 1905, under laws of Guernsey, as a second reconstruction of Golden Mint Mines, Ltd., with capitalization £120,000, shares £1 par. Mine, 8 miles east of Lake Mjosen and 50 miles north of Christiania, was first worked very early in the Nineteenth Century. Development is by tunnel, showing a vein of 30′ width, carrying copper and gold values. Has a mill with 15 stamps, 3 Frue vanners, Wilfley tables and an Elmore concentrating plant. Mine evidently has made some considerable production in the past, as evidenced by large slag-piles.

BUCHANAN COPPER MINES, LTD. **AUSTRALIA.**

Mine office: Mungana, Queensland, Australia. Lands, sundry claims at Welcome Creek, circa 15 miles west of Mungana. Presumably idle.

BUCHANAN MINE. **CALIFORNIA.**

Office and mine: care of G. A. Pherson, owner, Daulton, Madera Co., Cal. Lands, sundry claims, 5 miles northeast of Daulton, near the Green Mountain mine, opened by shafts and tunnels. Property shows diabase and amphibolite schist, both mineralized. Ores are oxides near surface and unaltered sulphides at depth. Shipments made by lessees averaged about 15% copper and $3 gold per ton. Idle for some years.

BUCKEYE & CALUMET-ARIZONA MINING CO. **ARIZONA.**

Mine office: Red Rock, Pinal Co., Ariz. Organized circa April, 1906, to operate in the Owl Head district. Presumably idle.

BUCKEYE CONSOLIDATED GOLD & COPPER MINING CO. **NEW MEXICO.**

Dead. Formerly at Socorro, Socorro Co., N. M.

BUCKEYE COPPER CO. **WASHINGTON.**

Office: 318 American Trust Bldg., Cleveland, Ohio. Letter returned unclaimed from former mine office, Index, Snohomish Co., Wash. Organized under laws of Washington. Lands, 3 claims, 5 miles southeast of Index, formerly held by Index-Independent Mining Co., showing a vein of 4′ to 12′ width, carrying a 15″ to 18″ pay-streak of massive chalcocite, balance of vein carrying bornite and chalcopyrite with quartz gangue. Has tunnels of about 300′ and 1,000′, and has shipped several carloads of ore giving returns of about 16% copper. Idle.

BUCKEYE COPPER MINING CO. **IDAHO.**

Office and mine: care of S. P. Fairweather, Wallace, Shoshone Co., Idaho. Organized circa July, 1907, with capitalization $375,000, shares 25 cents par. Lands, 9 claims, adjoining the Bullion property, near the Montana line.

BUCKEYE MINING & SMELTING CO. **OREGON.**

Office: care of W. H. Ramsey, vice-president, Grants Pass, Ore. Mine office: Galice, Josephine Co., Ore. J. M. James, president; W. P. McCoy, general manager. Organized under laws of Pennsylvania. Property is the Buckeye mine, opened by two tunnels, showing ore assaying up to 20% copper and $5 to $20 gold per ton. Company planned building a 100-ton smelter, but it did not materialize.

BUCKHORN GOLD & COPPER MINING CO. **BRITISH COLUMBIA.**

Dead. Formerly at Greenwood, Boundary district, B. C.

BUCKSKIN MOUNTAIN COPPER CO. **ARIZONA.**

Mine office: Ryan, Coconino Co., Ariz. Lands, 33 claims, area 660 acres,

also 80 acres miscellaneous lands, 7 miles from Ryan, showing blanket carrying highly silicious carbonate ores, estimated to average 10% in co which is too high, and said to have 500,000 tons of ore in sight, with 10 tons blocked out for stoping, also considered an overestimate. Mine is wo open-cast, and ore is sent to works at Ryan by wagon. Works include a ton leaching plant and a small smelter, obtaining water from the mine 7-mile pipe-line.

BUDGERYGAR MINING CO., N. L. AUSTRA

Mine office: Hermidale, Canbelego Co., N. S. W., Australia. Orga 1907, under laws of New South Wales, with capitalization £5,000, share par. Has a 260′ shaft said to show a 9′ vein of 30% copper ore. In 1908, planned installing a £700 hoisting plant.

BUDGERY KING COPPER MINING CO., N. L. AUSTRA

Mine office: Hermidale, Canbelego Co., N. S. W., Australia. Orga circa November, 1907, under laws of New South Wales, with capitaliz £6,000, shares £5 par.

BUDGERY MINES, N. L. AUSTRA

Mine office: Cobar, N. S. W., Australia. Mine office: Hermidale, belego Co., N. S. W., Australia. M. J. Corbett, chairman; J. M. Will superintendent. Organized 1906, under laws of New South Wales, capitalization £80,000, shares 10s. par. Lands, 3 miles from Hermidale, a series of lenses, with an oxidized zone of considerable depth carrying n copper and cuprite. The 365′ main shaft shows low grade ores of about average copper tenor, and a vein of black sulphide ore, reported as 20′ t in width. Company claims ore reserves of 40,000 tons on the 164′ level. duction, 1906, was circa 200 long tons of ore, yielding 22 tons long fine co Employed 22 men at last accounts. Property considered promising.

COMPAÑIA MINERA EXPLOTADORA DE BUENA ESPERANZA. CH

Office: Iquique, Chile. Mine office: Santa Rosa, Tarapacá, Chile. C ized Dec. 5, 1905, under laws of Chile, with capitalization £10,000, £1 par.

BUENA VISTA COPPER MINES, LTD. MEX

Dead. Formerly at Santa Rosalia, Sur, Baja California, Mex. Des Vol. VI.

BUENA VISTA COPPER MINING CO. ARIZ

Mine office: Solomonville, Graham Co., Ariz. Has a 100′ shaft, sh ore, and sent a sample shipment of 25% ore to the El Paso smelter, 1903.

BUENA VISTA COPPER MINING CO. CALIFO

Mine office: Valley Springs, Amador Co., Cal. Property includes th Run and Russell mines, carrying sulphide copper ores in schistose di Has steam power. Idle.

BUENA VISTA MINING & MILLING CO. ARIZ

Dead. Formerly at Washington, Santa Cruz Co., Ariz.

BUENA VISTA SMELTING & REFINING CO. COLOR

Office: Chester, Pa. Works office: Buena Vista, Chaffee Co., Colo. Hinkson, general superintendent; Wm. P. Eyre, superintendent. Plan 125-ton smelter, employing circa 40 men. Company does a general c smelting business on gold, silver and copper ores.

BUENOS AIRES MINING CO. MEX

Dead. A swindle, perpetrated by the notorious Dr. R. C. Flower. posedly located at Cusihuiriáchic, Iturbide, Chihuahua, Mex. "Assets" inherited by the Pan-American Mining & Smelting Co.

A MINERA BUERRERO DE **ARGENTINA.**
E HERMOSO.
Santiago de Chile. Mine office: Mendoza, Argentina. Organized 907, under laws of Chile, with capitalization 230,010 pesos, shares ar.

NING, MILLING & SMELTING CO. **MEXICO.**
office: 709 Lankershim Bldg., Los Angeles, Cal. Letter returned from former mine office, La Bufa, Sahuaripa, Sonora, Mex. Davis , president; Wm. E. Richardson, vice-president and general man- n W. Riley, secretary; Lewis B. Richardson, treasurer. Organized r laws of Arizona, with capitalization $1,500,000, shares $1 par. Has vidends, last being $60,000, July, 1905. Lands, 123 acres, also a llsite, and 5,000 acres miscellaneous lands, showing 6 fissure veins, under development average 4′ width, opened by a 600′ incline, giv- e assays of 10% copper, 10% lead, 4% zinc, 150 oz. silver and $2.50 n, from argentiferous tetrahedrite and copper sulphides. Has shafts d 600′, and a 225′ tunnel, with 8,000′ of workings and about 30,000 gh-grade ore blocked out, with a considerable amount of low-grade dump, for eventual treatment.
nery includes a 120-h. p. plant at the mine, with 2 hoists, 2 Rand ssors and 7 power drills. Mine buildings include several small shops, wmill and about 20 dwellings.
5-ton concentrator has a small sampling mill attached. There also is eaching plant.
melter, at the mine, receives ore by gravity tram. Equipment 0-ton and 25-ton reverberatory furnaces, built of silica brick, made ound. Fuel is inferior wood, cut on the premises. Product is a ying 50% copper, 600 to 800 oz. silver and 1.5 oz. gold per ton, hipped to Aguascalientes, via Guaymas, for refining, some rich ore ped also. Transportation is by burros, but rail connection is expected extension of the Cananea, Rio Yaqui y Pacifico. Production, 1904, 1,200,000 lbs. fine copper, but operation since hampered by Yaqui ising. Has employed as many as 600 men in the dry season. Idle 1906.

-ARIZONA GOLD MINES CO. **ARIZONA.**
42 Westminster St., Providence, R. I. Mine office: Turkey, o., Ariz. Arthur E. Brown, secretary and treasurer. Lands, 18 a 360 acres, known as the Parker group, 2½ miles from Turkey. inally a gold producer, shows copper values at depth of 50′ in a vein mated width. Has a 5-stamp mill and plans adding a cyanide plant. d a little ore to the Humboldt smelter.

& ARIZONA MINING CO. **ARIZONA.**
office: Morristown, Maricopa Co., Ariz. W. H. Crandall, treasurer; ennett, general manager; Henry G. Bennett, superintendent. Lands, Gulch, on lower Turkey Creek, between Morristown and Hot ave a 319′ shaft, bottomed in chalcopyrite ore running about 3% oz. silver and $2 gold per ton. Mine has 3 levels, with about 800′ s. Has steam and gas power, a 2-stamp-mill having a 5,000-gallon k, and 13 buildings. Employed 15 men and shipped a $4,000 bullion June, 1908.

MINING CO. **MONTANA.**
office: Saltese, Missoula Co., Mont. O. H. Linn, superintendent ion increased, 1907, to $1,500,000, shares $1 par. Lands, 2[illegible] k, near the divide of the Bitter Root Mountains, 6 miles [illegible]

Monitor, showing 4 copper veins, 2 argentiferous, developing by a crosscut tunnel.

BUFFALO SMELTING WORKS. **NEW YORK.**

Owned by Calumet & Hecla Mining Co.

COMPAÑIA DEL FERROCARIL y MINAS DEL BUITRON. **SPAIN.**

Mine office: Zalamea la Real, Huelva, Spain. Don Diego Bull, general manager. Company is controlled by F. C. Hills & Co., of London. Mines include El Castillo del Buitron and La Poderosa, area 6 hectares, at Zalamea le Real, and the Concepción mine, area 42 hectares, at Almonáster. Sundry other properties are under exploration. Annual production averages about 1,500,000 lbs. fine copper.

BULLARD BROS. **ARIZONA.**

Office: Wendendale, Yuma Co., Ariz. Lands, 5 claims, in Cunningham Pass, Harcúvar Mountains, are said to show considerable ore assaying 7 to 10% copper and $10 in gold and silver per ton.

BULL DOMINGO MINING CO. **WYOMING.**

Mine office: Hecla, Laramie Co., Wyo. Ores carry copper and gold values. Idle for several years.

BULLION-BECK & CHAMPION MINING CO. **UTAH.**

Office: Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. John Beck, president; W. J. Beatty, secretary; Philo T. Farnsworth, general manager; L. C. Doty, superintendent. Capitalization $1,000,000, shares $10 par. To March, 1908, had paid dividends of $2,568,000, regular dividend rate being 2 cents per share, and paid a 60-cent dividend, of $60,000, April, 1908.

Lands, 3 claims. In 1908 sold circa 10 acres of fractional claims, formerly in dispute, to the Centennial-Eureka, and made side-line agreements with this company, stopping litigation. Mine produces mainly auriferous lead carbonate and silver chlorides, with small copper values, and has one small reserve of high grade ore, with considerable quantities of low grade ore developed for extraction later. Has a 1,300′ shaft, with a 200′ winze from the bottom level, and is mining from the 100′ to 1,200′ levels, inclusive, there being considerable water on the 1,300′ level. Has a 200-ton mill, with steam and electric power, employing about 75 men, and has been a producer since circa 1880. Production, 1907, was 248 carloads of ore, and output, first half 1908, was circa 1,000 tons of ore monthly, partly from work of lessees.

BULLION CITY BORNITE COPPER MINING & MILLING CO. **COLORADO.**

Office: Ebensburg, Pa. Letter returned unclaimed from former mine office, Aspen, Pitkin Co., Colo. T. V. Hott, president; A. W. Van Houten, secretary and general manager. Lands, 11 claims, 7 patented, area 110 acres, 5 miles distant from railroad, with good wagon-road between. Has shafts of 50′ and 90′, showing a 2′ vein of bornite, assaying 25% copper, 53 oz. silver and oz. gold per ton.

BULLION GOLD & COPPER CO. **NEVADA.**

Letter returned unclaimed from former mine office, Reno, Washoe Co., Nev. Capitalization $1,000,000, shares $1 par. Lands, 8 claims, in the Peavine district, circa 20 miles north of Reno and 1½ miles from a railroad, having several shallow shafts.

BULLION MINING CO., LTD. **IDAHO.**

Office: Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. B. F. O'Neil, president; Jas. H. Taylor, secretary; A. D. McKenzie, general manager. Organized 1902, under laws of Idaho, with capitalization $1,000,000, shares $1 par. Lands, 8 claims, 3 patented, area 160 acres, lying about 4 miles west of the Monitor mine, on the Idaho slope of the Bitter Root divide.

y shows a vein of 20′ maximum width, with average of 6′ to 12′, car- nainly chalcopyrite, with some bornite, associated with siderite, having stone gangue, said to average 3.2% copper and 0.4 oz. silver per ton, races of gold, also some ore of better grade. Mine is opened by a 70′ tunnel and a 780′ crosscut lower tunnel, with 1,380′ of workings, well ed with pine, hemlock, tamarack and fir. Has steam power and a 12-h. p.

ION MOUNTAINS COPPER CO. **CALIFORNIA.**

ffice: 1221-52 Broadway, New York, N. Y. Mine office: Lavic, San Bernard- o., Cal. Organized under laws of Arizona, with capitalization $1,500,000, $1 par. Was promoted by H. R. Leighton & Co., since bankrupt. any claims to have mines and reduction works at Lavic, hence pre- bly succeeded to property of the Peacock Copper Co., which had a concentrator, but ran out of ore. Regarded with suspicion. Idle.

LOCK MINING & MILLING CO. **UTAH.**

Mine office: Eureka, Juab Co., Utah. Has 600,000 shares. Property has 2 s, carrying argentiferous copper sulphides of fair tenor. Begun shipments

LLWHACKER COPPER CO. **MONTANA.**

Office: care of Patrick Clark, president, Spokane, Wash. Mine office: te, Silver Bow Co., Mont. J. J. Stewart, vice-president; W. C. Moyer, retary; F. S. Hays, treasurer; John Bresnehan, superintendent. Organized rch 20, 1906, under laws of Arizona, with capitalization $1,000,000, shares par. Is controlled by President Clark, who is supposed to own about 80% the stock. Paid monthly dividends of 1 cent per share, early 1907. Lands, claim, lying east of the Pittsburg & Montana, having a 400′ shaft showing W fault with a paystreak of 15′ to 20′ width, carrying workable values, ainly in carbonate ores and chrysocolla, averaging about 3.5% copper, both rrying practically no gold or silver values. Also has a little chalcocite, up 24% in copper tenor. Ore is silicious and does not concentrate well, hence periments have been made with a leaching process. In 1906 lessees produced 228 tons of silicious ore, averaging 4.97% copper, extracted from depth of s than 100′, and company itself produced nearly an equal amount of ore, ving production estimated as equal to 850,000 lbs. fine copper. Shipments ined latter half of 1907. Property considered promising.

ULLWHACKER GOLD & COPPER CO. **ARIZONA.**

Dead. Merged in Great Belcher of Arizona Co. Formerly at Prescott, rapai Co., Ariz.

ULLY HILL COPPER MINING & SMELTING CO. **CALIFORNIA.**

Office: 42 Broadway, New York, N. Y. Mine office: Winthrop, Shasta Co., D. M. Riordan, president; Anson W. Burchard, vice-president; M. F. rstover, secretary; John B. Keating, general superintendent; Herbert R. ley, assistant superintendent. Organized 1900, under laws of New Jersey, h capitalization $2,500,000, shares $25 par, full paid, but, after acquisition control, 1905, by General Electric Co., capitalization was reduced to 00,000. Bonds, $400,000, issued for construction of Sacramento Valley & tern Railway, stock of which is owned by the Bully Hill.

Lands, 23 claims, 18 patented, area 213 acres, in the Pittsburg district, 25 miles northeast of the Iron Mountain mine and supposedly in the geological horizon. Property includes the Bully Hill, Winthrop, Copper and Anchor or Rising Star mines, all connected properties except the r City, circa 3 miles southwest of the Bully Hill. Company is said to bought the Northern Light mine, at Winthrop, and the Tamarack group asta City is held under a $10,000 bond.

The Bully Hill was opened as a gold mine, working the gossa rather indifferent results, until copper ores were developed at depth. Hill, with a diameter of about 4,000′, rising 1,200′ above the surro country, is composed of eruptive rocks, principally basalt and rhyolit 3 mineral zones, having a strike of approximately north and south, t occurring in shear-zones in rhyolite and meta-diabase dykes, all of super slaty structure, lenses having a clay gouge of 1′ to 30′ on one or both Main lenses have stringers and feeders, ranging from a few inches to width, carrying 2 to 30% copper. The principal lenses are 20′ to 300 and 2′ to 40′ wide, averaging about 30′, and opened to a depth of circa The zone of secondary enrichment shows about 10′ of bonanza ore, the ore bodies below carrying chalcopyrite associated with pyrite, also a bornite and chalcocite, with occasional oxidized ores and native copper. best ore body gives average assays of about 15% copper, 6 oz. silver, a gold per ton, and shows native copper and native silver in considerable tities on the 670′ level, the average copper tenor of the mine being abou with combined gold and silver values up to $25 per ton.

The Bully Hill mine is opened by crosscut tunnels of 600′, 800′, 1,000 1,200′, giving a back of about 350′. No. 2, the main working tunnel, long, has double tracks and a 100x100′ underground station containing p ful pumps and double-drum electric hoist for the 3-compartment 970′ shaft starting from this point.

The Bully Hill has steam and electric power aggregating 300 h. p. mine and 350 h. p. at the smelter. Equipment includes four 100-h. p. good for 1,000′ depth each, and 3 Rand air-compressors, of 14 drills agg capacity. Buildings, about 20 in number, include a 40x50′ iron-sh machine-shop.

The Copper City mine, area 70 acres, is opened by an upper tunnel and a lower tunnel of circa 1,000′ length, driven by Capt. J. R. De La M

The Anchor, or Rising Star mine, has a 3-compartment 800′ shaft double-drum electric hoist, and works 2 levels, known as the 6th an showing considerable good ore.

The Winthrop mine has a 16′ vein of ore of fair copper tenor.

The smelter, about one-half mile from the mine, receives ore the by the Bully Hill railroad, a 4-mile standard-gauge private line having a Baldwin locomotive. The smelter, remodeled 1907-1908, is reported b pany to have about 250 tons daily capacity, fuel being mainly coke, mented by petroleum for the reverberatory. The smelter building is 3 with a 90′ stack, and is terraced throughout, permitting handling material by gravity. The calcining department has roast-stalls in series 2 McDougal circular calcining furnaces and two 42x120″ rectangular jacket blast-furnaces, with one 50-ton reverberatory for treating fine flue-dust. First-fusion product is a matte of 35 to 50% copper tenor, in ladles, by electric traveling crane, to the converter department, whi 2 stands, with 68x96″ shells of barrel type, turning out blister copper o tenor, shipped to the DeLamar works at Chrome, N. J., for electrolytic re Limestone and iron ore for fluxing are obtained from quarries on the M river, 6 miles distant, but there is a scarcity of suitable ferruginous ores for fluxing the high grade sulphides of the Bully Hill mine.

The Sacramento Valley & Eastern Railway, 17 miles long, controll the company, completed, 1907, at a cost of circa $500,000, runs from Wi to a connection with the Southern Pacific, at Pitt, 3 miles from Ke running through Heroult and Copper City.

The property employs about 500 men. Ores from the 3 leading

have been given thorough smelting tests, and the company's permanent plans arranged in accordance with the results. There was no copper production, 1906 or 1907, during which years the property was being systematically developed, but smelting was resumed March 30, 1908, with one furnace. Annual production formerly was about 5,000,000 lbs. fine copper, but should reach nearly 15,000,000 lbs. fine copper in 1909. The Bully Hill is perhaps the highest grade copper mine in California, and has an experienced and thoroughly capable management.

BUNDARRA MINE. **AUSTRALIA.**

Mine office: Bundarra, N. S. W., Australia. Max Gorler, owner. Lands, in the Tingha division of the Peel & Uralla mining district, show a 4' to 8' vein of sulphide ore, deepest workings being circa 300'. Has a smelter with a small reverberatory furnace, making 45% matte. Production, 1907, estimated at 250,000 lbs. fine copper. Employed 60 men, 1907.

BUNKER HILL MINE. **ARIZONA.**

Office: care of Col. Emil Rautman, Prescott, Ariz. Mine office: Big Bug, Yavapai Co., Ariz. Lands, 10 claims, in the Big Bug and Walker districts, circa 10 miles southeast of Prescott, opened by a tunnel of about 1,600' length.

BUNKER HILL MINING & SMELTING CO. **WASHINGTON.**

Office: 5011-1 Madison Ave., New York, N. Y. Mine office: Index, Snohomish Co., Wash. Works office: Reiter, Snohomish Co., Wash. Chas. G. Reiter, president; Lewis H. Nash, vice-president; John D. Campbell, secretary; Wilbur Morris, treasurer; V. V. Clark, general manager; Chas. A. McClain, superintendent; Thos. W. Collins, smelter superintendent. Organized Oct. 24, 1906, under laws of Maine, with capitalization $3,000,000, shares $1 par, as successor of Bunker Hill-Sullivan Copper Mining Co., and capitalization increased, June, 1908, to $1,500,000, shares $1 par; also, June, 1908, authorized issue of $500,000 of 8% cumulative preferred stock, to raise funds for retirement of bonded debt, payment of second-mortgage notes, and payment of sundry current obligations.

Lands, 18 claims, area circa 300 acres, 5 miles west of Index, on May Creek, below Lake Isabelle, known as the Copper Bell group, also a 5-acre millsite. Lands show fissure veins in granite, and contact veins between granite and diorite. Property was diamond-drilled, 1907. Mine has shafts of 90' and 600', showing 2 ore bodies, one a vein of 2' to 50' estimated width, carrying chalcopyrite averaging about 1% copper, 0.5 oz. silver and 40 cents gold per ton. Has compressed air and electric power, generated by a water-wheel taking water from Lake Isabelle, 2 hoists and a 10-drill Ingersoll-Sergeant duplex air-compressor, with various mine buildings.

The mill, enlarged, 1907, to 100 tons daily capacity, has Blake and Austin crushers, rolls, Wilfley tables, slime tables, buddles and a magnetic separator.

The 75-ton smelter, of wood frame, was blown in July, 1908. Some concentrates were shipped, 1906.

BUNKER HILL-SULLIVAN COPPER MINING CO. **WASHINGTON.**

Dead. Organized March 20, 1900, and reorganized Oct. 24, 1902, as Bunker Hill Mining & Smelting Co. Formerly at Index, Snohomish Co., Wash.

BUNKERVILLE MINING CO. **NEVADA.**

Mine office: Bunkerville, Lincoln Co., Nev. Idle.

BURGAN DEVELOPMENT CO. **MEXICO.**

Office: Douglas, Ariz. Mine office: Fronteras, Arizpe, Sonora, Mex. Property, near Fronteras, is said to be opened to depth of [illegible]. Presumably idle.

BURLINGTON COPPER MINING CO. **WYOMING.**

Mine office: Encampment, Carbon Co., Wyo. Idle.

BURMA COPPER MINES, LTD.

Office: 716 Salisbury House, London, E. C., Eng. W. T. Warriner, ...retary. Organized Nov. 5, 1903, under laws of Great Britain, with capita... tion £100, shares £1 par. Moribund.

BURMA MINES DEVELOPMENT & AGENCY, LTD. BURM...

Office: 730 Salisbury House, London, E. C., Eng. M. F. Kinder... chairman; H. E. Franck, secretary. Organized Nov. 6, 1903, under ... of Great Britain, with capitalization £50,000, shares £1 par, fully issued ... prospect for copper in the Monywa district, and dredge for gold on the Ch... wen river, Burmah.

BURNETT (QUEENSLAND) EXPLORATION CO., LTD. AUSTRAL...

Dead. Lands sold to Queensland Copper Co., Ltd. Formerly at Mo... Perry, Bowen Co., Queensland, Australia.

BURNIE COPPER MINES. TASMANI...

Office: National Mutual Bldg., Melbourne, Australia. Mine office: Cup... na, Tasmania. Jas. Harvey, chairman; Leigh J. Hancock, superintendent; H. Hodgson, auditor. Is incorporated. Lands, 205 acres, partly freehold including the townsite of Cuprona. Mine, known as the Copper King, has 155′ shaft, sunk in the footwall. At 150′ depth the north ore chute had disappeared, and the south ore chute showed decreased values. Property has a fair power equipment. A little ore, shipped to New South Wales smelters, returned circa 25% copper. Employs about 30 men. Production, 1906, was 236,880 lbs. fine copper. Prospects of company are not especially promising.

BURNS MINING CO. WASHINGTON.

Mine office: Darrington, Snohomish Co., Wash. Lands include the Myrtle and Justice claims, opened by tunnel. Idle.

BURNS-MOORE MINING & TUNNEL CO. COLORADO.

Mine office: Jackson Bldg, Denver, Colo. Mine office: Idaho Springs, Clear Creek Co., Colo. Dr. John M. Shaller, secretary, treasurer and general manager. Organized March 27, 1902, under laws of West Virginia, with capitalization $250,000, shares 10 cents par. Lands, 40 lode claims, 5 placer claims and a millsite, all patented. Development is by a 3,210′ tunnel, starting from Chicago Creek, circa 7 miles from Idaho Springs, and running to Saxon Mountain, intersecting a number of mineralized veins carrying gold, silver, lead and copper values. Has water power. Idle for several years.

BURRA (BOBBY) COPPER MINING CO. AUSTRALIA.

Mine office: Cobar, Robinson Co., N. S. W., Australia. Organized, 1907, under laws of New South Wales, with capitalization £1,500, shares £10 par.

BURRA BURRA COPPER MINING CO., N. L. AUSTRALIA.

Office: Eagle Chambers, Adelaide, South Australia. Mine office: Burra Burra, Burra Co., South Australia. T. B. Gall, chairman; V. Lawrence, secretary and treasurer; Wm. West, general manager; Jas. S. Pryor, superintendent. Organized 1901, under laws of South Australia, with capitalization £120,000, shares £1 par, 10s. paid in; issued, £95,173. Lands, 672 acres, freehold, with mineral rights to 11,065 acres of adjoining lands. Country rock is argillaceous slate. Mine is opened by 5 tunnels, of 600′, 300′, 330′, 420′ and 180′. Ores in upper levels were cuprite, malachite, azurite and native copper, occurring in very rich but irregular bunches, lower levels showing bornite and chalcopyrite. Property, opened 1845 and closed 1877, made 51,662 long tons fine copper, valued at £4,749,224, and paid dividends of £826,585. Ore was shipped to Port Adelaide, 107 miles, by rail, for smelting. Fuel was wood, costing 12s. per cord, and soft coal at 30s. per ton. Was reopened 1901, ore averaging about 2% copper only, and production, 1903, was about 100 long tons fine copper. Has steam and electric power. Idle several years.

AGA COPPER CO. **AUSTRALIA.**

ne office: Burraga, Bathurst Co., New South Wales, Australia. Mine, 1877, circa 1 mile east of the Lloyd, has a vein of 67′ average width, chute of rich ore of about 100′ length carrying chalcopyrite with quartz averaging 6.5% copper tenor, with 1 to 3 oz. silver per ton. The vein n a belt of highly altered rocks, ranging from porphyry to schistose Mine is circa 800′ deep. Smelter has 3 reverberatory furnaces, using r fuel, making a 47% matte, sent to Lithgow for refining. Supply of precarious in bad weather, when the roads are impassable. Presumably

MOUNTAIN COPPER CO. **NEW MEXICO.**

e: 402-108 Equitable Bldg., Chicago, Ills. Mine office: Leopold, ., N. M. Nathan F. Leopold, president; E. Shepherd, vice-president; . Leopold, secretary and treasurer; Jas. T. Hall, superintendent. d 1904, under laws of New Mexico, with capitalization $50,000, , 1906, to $100,000, shares $1 par. Phelps, Dodge & Co. hold a share and are represented on the board of directors by C. E. Mills. Com- perated as a close corporation.

s, 60 claims, area circa 1,000 acres, formerly held on bond and lease, ıt, 1906, from Southwestern Copper Co. Property shows 36 porphyry carrying silicates giving assays of 10 to 25% copper, 5 ore bodies eloped. Extensive diamond drilling is planned.

ld mine, 15 claims, known as the St. Louis, is said to have produced of $1,000,000 worth of ore, under former ownership, shipping ores 5 to 25% in copper tenor.

ipal development has been on the Sampson and St. Louis veins. terally for more than 2,000′, estimated to show about 3,000,000 tons th approximately 2,500,000 tons blocked out, assaying 3.4% copper, om chalcocite, without appreciable precious metal values. About openings have been made on the 2 veins, and the Sampson ore body ed at 100′ to 200′ width, 300′ depth and about 1,000′ length.

is developed by 4 shafts, the Sampson, St. Louis, McKinley and ch more than 200′ in depth, with especially promising indications in n shaft. The east ore body, which is the last developed, shows about tons of ore, averaging over 3% copper. Mine is operated largely on g system, obviating excessive timber requirements. Equipment lectric hoists and pumps, with a steam hoist at the Sampson shaft. include a townsite, improved with water-works, electric lights and l buildings, including a hotel and numerous dwellings.

oncentrator, built circa 1905, has been twice remodeled and brought capacity of 300 tons daily. Equipment includes a dynamo for power -light electric generator. It is planned increasing the mill to 1,500 capacity.

is a 10-ton smelter, of antiquated design, left by former owners, idle and worthless.

y has been made to the mine for a 14-mile spur of the Atchison, Santa Fé railway, and road probably will be built in 1909.

Burro Mountain was a considerable producer in 1907, and did not work during the panic period, though reducing output of concentrates iling in various directions. Concentrates have been smelted by the Colorado Smelting Co. and Shannon Copper Co., and production to 07, was about 15,000,000 lbs. fine copper. Property is considered of al promise, and management is good.

BURTON CONSOLIDATED COPPER CO. WYOMI

Dead. Formerly at Encampment, Carbon Co., Wyo.

BUSTER BROWN CO. ARIZO

Office and mine: Tucson, Pima Co., Ariz. Chas. F. Hoff, president general manager. Capitalization $3,000,000, shares $1 par. Lands, 5 cla area 100 acres, in the Amole district, 16 miles northwest of Tucson, slig developed, showing ores carrying fair assay values in copper and silv Presumably idle.

BUSTER MINES SYNDICATE, LTD. ARIZON

Dead. Formerly at Prescott, Yavapai Co., Ariz. Described Vol. VI.

BUTLER-LIBERAL CONSOLIDATED MINING CO. UTA

Office: 418-60 State St., Boston, Mass. Mine office: Bingham Canyo Salt Lake Co., Utah. J. J. Corum, president; C. N. Strevell, vice-presiden S. M. Orem, secretary and treasurer; Walter C. Orem, general manager; W Robbins, superintendent. Organized 1903, under laws of Utah, as a co solidation of the Ben Butler Mining & Smelting Co. and the Liberal Minin Co., with capitalization $500,000, shares $1 par. Paid a dividend of $2,50 October, 1903.

Mine is opened by the Butler shaft and tunnel, latter said to show 2' of smelting ore, and the Jacobs tunnel. Has shipped ore to the United State smelter returning 6% copper, 12 oz. silver and $1 gold per ton.

BUTLER MINING & MILLING CO. UTAH

Dead. Merged, 1904, in Butler-Liberal Consolidated Mining Co. Formerly at Bingham Canyon, Salt Lake Co., Utah.

BUTTE & ANACONDA COPPER CO. MONTANA

Dead. Succeeded, 1902, by Carlisle Copper Co., also dead. Formerly a Butte, Silver Bow Co., Mont.

BUTTE & ANACONDA COPPER MINING CO. MONTANA

Office and mine: Butte, Silver Bow Co., Mont. Phil C. Goodwin, presi dent; Wm. Metting, vice-president; John E. Corette, secretary and treasurer preceding officers, F. Tomek, Geo. P. Porter and Jas. R. Spencer, director Organized June 6, 1906, under laws of Montana, with capitalization $1,000,00 shares $1 par. Lands, 20 claims, north of the Butte & Bacorn, showing min eralized ledges.

BUTTE-ARGENTA COPPER CO. MONTANA

Office: Butte, Silver Bow Co., Mont. Mine office: Argenta, Beaverhea Co., Mont. J. P. Oppenheimer, president; John F. Cowan, manager; J. T Ross, superintendent. Organized Feb. 12, 1906, under laws of Montana, wit capitalization $3,000,000, shares $10 par. Property, 12 miles west of Dillo known as the Iron Mountain mine, has a tunnel and 2 shafts, opened to depth of 200' on a wide vein of argentiferous silver-lead and copper ore, hav ing streaks assaying up to 16.5% copper and 30 oz. silver per ton. Upp levels were worked, years ago, for silver-lead, which changed to copper a slight depth. Equipment includes a 125-h. p. hydro-pneumatic power plan with Pelton wheel, and an 8-drill Ingersoll-Rand air-compressor. Employe circa 35 men at last accounts.

BUTTE & ARIZONA COPPER CO. ARIZONA & MONTANA

Dead. Formerly at Butte, Silver Bow Co., Mont., and Prescott, Yavapa Co., Ariz. Described Vol. VI.

BUTTE & ARIZONA COPPER MINING CO. ARIZONA

Office: care of J. H. Vivian, president, Butte, Mont. Mine office: Hereford Cochise Co., Ariz. A. P. Pohndorff, president; B. H. Dunshee, vice-president John E. Corette, secretary; John C. Adams, treasurer; preceding officers, L. C Evans, Charles S. Shoemaker and D. M. Watts, directors; John Hoatson, gen

al manager; Caspar Schultz, mine superintendent. Capitalization $1,250,000, ares $1 par.

Lands, 14 claims, 11 patented, costing circa $60,000, for which directors k $450,000 stock, well watered and partially wooded, in the Hunchuca ntains, circa 35 miles west of Bisbee and about the same distance north Cananea.

Property shows an ochrous gossan of 10′ to 300′ width, covering a contact n between syenite and limestone carrying occasional copper oxides, chal- ite, pyrite and argentiferous gray copper, chalcocite of fair tenor, though in large quantities. Development is by a 2,300 tunnel cutting several ll veins giving assays up to 18% copper with an average of 4.5% tenor, e having upwards of 3,000′ of workings. Main vein 350′ from mouth of nel is claimed to show 39′ of 6% chalcopyrite, which probably is an over- mate. Nearest railroad is 15 miles, with fair wagon road. Has steam power, air-compressor, employing circa 20 men. Continued work steadily during d of depression, but in 1908 suspended operations temporarily on account fire.

TE & ARIZONA COPPER MINING CO. **ARIZONA.**

Office: Prescott, Ariz. Mine office: Mayer, Yavapai Co., Ariz. Ernest laggott, president; Emil J. Baxter, vice-president; T. C. Job, secretary; . Hazeltine, treasurer; preceding officers and B. O. Kendall, directors; Burleson, superintendent. Organized June 6, 1905, under laws of Arizona, capitalization $5,000,000, shares $1 par; issued, $2,200,000. Annual ng, first Monday in May.

Lands, 9 claims, unpatented, area 180 acres, also 160 acres placer lands, Big Bug district, showing Algonkian schists, quartzite and diorite, car- 3 veins, ore bodies occurring as replacements in chloritic schist and as t deposits between hornblende schists and quartzite, 2 being developed. vein, of 70′ estimated width, traceable 4,800′, with 1,800′ of workings. ned by a 360′ tunnel and shafts of 120′, 175′ and 300′, showing chalco- averaging about 2.5% copper, 2 oz. silver and $2 gold per ton. Com- plans continuous development.

TE & BACORN MINING CO. **MONTANA.**

ffice and mine: Butte, Silver Bow Co., Mont. F. W. Bacorn, president anager; Geo. I. Whitney, treasurer; H. L. W. Hyde, secretary; Ed. ard, superintendent. Organized Feb. 12, 1906, under laws of Maine, with alization $5,000,000, shares $1 par. Lands, 21 claims, partly fractional, circa 230 acres, in the northeastern part of Butte, about 1 mile north of ittsburg & Montana and 1 mile northeast of the Anaconda, some distance any producing mine. Allowed options on claims on which the Calumet is located to expire, 1907, and attempted to remove improvements, but s of lands prevented. Had 3 shafts, including the Calumet, the Colleen shaft being about 400′ deep and the Belinda shaft 840′. The 1,050′ et shaft crosscut and drifted on 2 veins, showing ore below commercial . Had an 18x36″ first-motion hoist, good for 1,500′, on the Calumet . Idle early 1908, owing to failure of fiscal agents. Property is entirely le the proven zone, but is not devoid of promise, though payable ore, if l, probably will occur at great depth.

TE-BALLAKLAVA COPPER CO. **MONTANA.**

Office: 315 Sellwood Bldg., Duluth, Minn. Mine office: Butte, Silver Bow Mont. R. B. Dear, president; P. H. Nelson, vice-president; John A. Per- , secretary; Milie Bunnell, treasurer; preceding officers, John Panton, I. uth and Gus Carlson, directors; Hon. D. E. Morgan, J. T. Wyman and . Winston, trustees of escrow stock; Chas. W. Newton, superintendent.

Organized under laws of Arizona, with capitalization $2,500,000, shares par; issued, $2,100,000.

Lands are the adjoining Burke and Ballaklava claims, fractional, area acres, in a long irregular strip. Property was tied up by litigation for many years, but a settlement finally was secured between various claimants, by which title was vested in the Catholic bishop of Helena, who sold lands present company for $400,000 cash, final payment being made circa October 1907. Property is entirely surrounded by holdings of the Anaconda, Boston & Montana and Butte Coalition. Owing to the peculiar shape of the tract which is 1,860′ long on the strike of the vein system, it carries the apex of veins, of 25′ average width, with an aggregate of about 3,600′ of their strike. These veins are the Speculator and Edith May of the North Butte, the Old Joe, Mountain Chief and Sioux Chief, which, by reason of apexing on Butte Ballaklava lands, can be followed to any depth desired. By reason of this peculiar situation, the property is, for all practical purposes, materially larger than its actual area, by reason of the law permitting the following of apexing veins.

The mine has 2 shafts, 1 to the northwest of shallow depth, while the other, an old 2-compartment shaft, 283′ deep, has been cut down to 3-compartment size and sunk to 1,000′ depth. Crosscuts have been run on the 500′ and 700′ levels, and are being run on the 1,000′ level. The 2 upper levels show 3 veins, ranging 25′ to 90′ in width. The 500′ level shows iron pyrites and a little high grade silver-lead ore, which probably will not hold to depth. The 700′ level shows stringers of massive chalcopyrite, with frequent bornite, both argentiferous, and a narrow streak of chalcocite was cut in the shaft.

Electric power is used throughout, with an auxiliary steam plant in reserve for emergencies. Equipment includes a 165-h. p. double-drum electric hoist, good for 1,500′ depth, and 2 Ingersoll-Sergeant compound belt-driven 8-drill air-compressors having cross-compound air-cylinders, each driven by a 100-h. p. General Electric motor. An electric station pump is to be installed. Buildings include a wooden head-frame, engine-house, carpenter-shop, smithy and office.

The Butte-Ballaklava is 640′ from the North Butte mine, and carries the extension of both the Speculator and Edith May veins of the North Butte. The Mountain Chief mine of the Butte Coalition, immediately to the north, was a small producer under the management of Mr. Heinze. The Modoc and Modoc Extension claims of the Anaconda, immediately to the south, carry the largest ore body in Butte, but this is of low grade to the depth developed, which is only 1,000′. The Butte-Ballaklava lies immediately west of the Leonard and north of the Colusa, which are about 1,000′ distant each, these being the principal mines of the Boston & Montana. The location is one of the best in Butte, and as the management is good, there seems every reason to predict the opening of an exceptionally large and rich mine.

BUTTE & BEAVERHEAD COPPER CO. MONTANA.

Office: Butte, Mont. Mine office: Argenta, Beaverhead Co., Mont. John P. Reins, manager. Organized 1907, with capitalization $1,000,000, shares $1 par. No trace of operations.

BUTTE & BINGHAM COPPER CO. UTAH.

Office: Butte, Mont. Mine office: Bingham Canyon, Salt Lake Co., Utah. W. H. Nichols, president. Lands, 6 acres. In debt and moribund.

BUTTE & BINGHAM COPPER MINING & DEVELOPMENT CO. UTAH.

Letter returned unclaimed from former office, 35 Congress St., Boston. Mine office: Bingham Canyon, Salt Lake Co., Utah. Idle.

BUTTE & BOSTON CONSOLIDATED MINING CO. MONTANA.

Office: 42 Broadway, New York, N. Y. Mine office: Butte, Silver Bow Co., Mont. Jas. Phillips, Jr., president; Wm. D. Rockefeller, secretary and treasurer; John D. Ryan, general manager; Wm. E. Kane, mine foreman. Organized 1896, under laws of New York, with capitalization $2,000,000, shares $10 par. Debentures, $1,500,000 first-mortgage bonds, at 6%, due April, 1917. Has paid dividends, to Dec. 31, 1907, of $1,800,000, last dividend, $1 per share, having been paid February, 1904. Annual report to Montana authorities, June 1, 1905, gave assets of $3,636,918 and liabilities of $209,734. Net earnings were circa 89 cents per share in 1904; $5.38 per share in 1905; $6.25 per share in 1906, and $1.47 per share in 1907. Is controlled, through ownership of practically entire stock issue, by Amalgamated Copper Co. Annual meeting, first Monday in April.

Lands, 261 acres, including sundry mines and undeveloped claims, with part interests in other properties, also several thousand acres of placer lands, all in the Butte district.

Silver Bow No. 1 mine has a 3-compartment 1,000′ main shaft, connected underground with the Pennsylvania, Berkeley and Silver Bow No. 3 mines. Timbering is with 8x8″ square sets, and ore is trammed by horses. There is a 800-gallon Riedler pump on the 1,000′ level. Hoisting is done by a 16x42″ engine, operating 2 single-deck cages.

Silver Bow No. 2 has been idle for some years.

Silver Bow No. 3 mine has a 4-compartment 700′ shaft, planned to be deepened, and is timbered with 10x10″ square sets, with a 500-gallon Knowles pump on the 600′ level, and a 12x14″ Risdon hoist operates 2 single-deck cages.

The East Grey Rock mine has a 3-compartment 1,600′ shaft. Surface equipment includes a 20x48″ hoist, operating 2 double-deck cages, and a 28-drill Nordberg air-compressor.

The West Grey Rock mine has a 1,200′ shaft.

The Berkeley has a 3-compartment 900′ shaft, with 18x32″ hoist, operating 2 single-deck cages. It has been planned to work the Snohomish and Tramway mines through the Berkeley shaft. Property was tied up for nearly 3 years, until 1906, by litigation with the Heinze interests.

The Blue Jay mine has a 1,075′ incline shaft, sunk at 72°, having 2 compartments to the 600′ level and 3 compartments below. Hoist is 16x32″, operating 2 single-deck cages, with skips swung under.

The Belle of Butte mine, in Walkerville, has a 500′ shaft, developing cupriferous copper ore, with values mainly in silver, and has been worked, on a small scale, by leasers, for the past 10 years or more.

The Josephine mine, supposed to have a continuation of the Lexington vein of the La France, was operated, 1906-1907, by leasers, mainly for silver values.

Miscellaneous properties include the Kane No. 3, having a 200′ shaft, Wild Bill and various other mines having slight development.

The Butte & Boston owns two-thirds of the Tramway mine and one-half of the Snohomish mine, balance belonging to Butte Coalition, and these properties are described under title of latter company. The Tramway shaft has been sunk 1,500′, jointly, by the Butte & Boston and Butte Coalition.

The old concentrator and smelter, at Meaderville, were closed, 1905, and demolished later, ore now being sent to the Washoe works at Anaconda. There remain at the site of the old Meaderville works large quantities of slag, which may be resmelted.

The company employs, normally, about 400 men at its various mines.

The Butte & Boston ores are leaner in copper and richer in silver than

the average of the camp, ore averaging returns of circa 60 lbs. fine copper per ton, while its blister copper carries about 100 oz. silver per ton. For fiscal year ending June 1, 1906, production was 331,630 tons, yielding gross values of $10.89 per ton, with cost of extraction of $3.79 per ton, and reduction $2.27 per ton. Gross proceeds for year were $3,611,652, and total operating expenses $2,362,184, leaving net earnings of $1,249,467. For year ending June 1, 1908, extraction was 193,830 tons of ore, with gross costs $1,609,763 and total expenses of $1,314,158, leaving net earnings of $295,604. Production, 1907, was about 10,000,000 lbs. fine copper.

BUTTE & BOULDER MINING CO. MONTANA.

Office: Butte, Mont. Mine office; Boulder, Jefferson Co., Mont. Lands, 2 claims, held under bond and lease, having a 750′ tunnel, expected to cut, at depth of circa 500′, a vein carrying argentiferous and auriferous copper-lead ores. Was developing with a small force at last accounts.

BUTTE & BOZEMAN COPPER MINING CO. MONTANA.

Letter returned unclaimed from former office and mine, Butte, Silver Bow Co., Mont. O. P. Chisholm, president; C. B. Chisholm, vice-president and treasurer; R. B. Chisholm, secretary. Organized July, 1906, with capitalization $100,000, shares $1 par. Lands, 2 claims, area 40 acres, known as the Emily and Etta, lying northeast of the Butte & Bacorn. Idle.

BUTTE & BRADLEY COPPER MINING CO. MONTANA.

Mine office: Butte, Silver Bow Co., Mont. Jas. A. Talbot, manager. Organized circa January, 1907, with capitalization $1,500,000, shares $1 par. Lands, 5 undeveloped claims, in the extreme northeastern portion of the Butte district, said to carry 6 veins showing surface ores carrying copper and silver values. Idle.

BUTTE & BUXTON COPPER MINING CO. MONTANA.

Office and mine: Butte, Silver Bow Co., Mont. Chas. O. Savage, vice-president; Chas. Fasel, secretary and manager; Jas. B. Higgins, consulting engineer. Organized April, 1908, under laws of Arizona, with capitalization $3,500,000, shares $10 par; issued, $1,500,000.

Lands, 13 claims, 3 held under bond and lease, area circa 250 acres, 15 miles southwest of Butte, in the foothills of Fleecer Mountain, carrying circa 6,000′ of the strike of a vein which was mined for silver-lead values, circa 1890, by several shallow shafts. Country rock is granite, much similar to that at Butte, covered by a 1′ to 4′ wash, having a mineralized zone of about one-half mile width, with 4 veins, with a diorite dyke to the northward. Shallow pits and trenches show continuity of veins, which are leached at surface, showing a little carbonate ore below commercial grade.

Development is by several old and shallow shafts, and by a tunnel of circa 300′. A wide ledge carries a mineralized streak along the footwall, showing mainly pyrite, with some argentiferous chalcopyrite and occasional carbonate stains, with a highly silicious gangue. Has secured ore assaying up to 14 to 23% copper and 24 oz. silver per ton, with small gold values, also galena assaying 11% lead, 24 oz. silver and $1 gold per ton. Company plans sinking shafts. Property considered promising and present management good.

BUTTE-CABLE COPPER & GOLD MINING CO. MONTANA.

Office: 116 Hamilton St., Butte, Mont. Mine office: Cable, Deer Lodge Co., Mont. R. G. Huston, president; J. Chauvin, secretary and treasurer. Organized Nov. 21, 1906, under laws of Montana, with capitalization $1,000,000, shares $1 par. Lands, 6 claims, 4 patented, circa 15 miles west of Anaconda, near the Cable Consolidated Mining Co., showing a 30″ vein of ore of commercial grade, opened by tunnel.

BUTTE-CAROLINA MINING & MILLING CO. **MONTANA.**

Office and mine: 47 East Broadway, Butte, Silver Bow Co., Mont. J. R. Ellingwood, secretary and treasurer. Organized circa 1906, with capitalization $200,000. Company advertised May, 1906, that it would be shipping ore next month, but failed to redeem this promise. Apparently merely a stock-jobbing enterprise.

BUTTE CENTRAL & BOSTON COPPER CORPORATION. **MONTANA.**

Office: 27 State St., Boston, Mass. Mine office: Butte, Silver Bow Co., Mont. Chas. Howard Weston, president; R. G. McMeekin, vice-president; John A. Condy, secretary; Freeman I. Davidson, treasurer; Sir F. W. Gordon, chairman executive committee; John M. Cameron, managing director. Organized April, 1906, under laws of Maine, with capitalization $15,000,000, reduced, August, 1906, to $7,500,000, shares $10 par, divided into $2,500,000 cumulative 7% preferred stock and $5,000,000 common stock. Lands, 2 claims, patented, area 28 acres, one of which is the Ophir mine. In 1906 bought lands of the Butte Northern Copper Co., area 98 acres, over which there was some litigation, apparently now settled. Company claims 8 ore bodies, of which 4 have been developed more or less. The Ophir has 3 veins, carrying fair silver values, with increasing copper values at depth, and with only slight traces of zinc on the 500′ level. Company reports veins as of 12′ to 90′ width, with sulphide ores ranging from a trace to 1% copper, 8% lead, from a trace to 8% zinc, 20 oz. silver and $1 to $10 gold per ton. Development is by shafts of 520′, 120′ and 160′, with several other shafts of 20′ to 60′ depth, giving a total of 9,000′ of workings, estimated to show 750,000 tons of ore, with 250,000 tons blocked out for stoping, which seems an overestimate. The Ophir, which has yielded ores assaying up to 7.2% copper, 1 oz. silver and $2.20 gold per ton, is an old property, operated 1880-1883, then a considerable producer, though poorly opened, with indications that a profitable copper zone may be reached at a depth of about 1,000′. Old shaft was cut down and enlarged, 1907, to 3 compartments. Mine has levels opened at 100′ intervals, upper levels having been stoped out by former owners. Property includes the Snowbird claim, south of the Davis-Daly, with options on various other claims in Butte.

Equipment includes a 250-h. p. steam plant and 60-h. p. electric plant, 100-h. p. and 500-h. p. hoists and a 7-drill Rand air-compressor. There are several buildings, including an 18x24′ carpenter shop, 18x36′ smithy, office, engine-house, etc.

Work was suspended December, 1907, previous to which 16 sets of leasers were working, paying 35% royalty on gross values. Second-class ore is stocked, extracted, and probably can be concentrated later. Ore produced, 1907, carried 30 oz. to 60 oz. silver per ton, with trivial copper values.

Company has confessed judgment of $51,445 on a note due the Tri-National Copper Corporation, of Boston, and is said to have an indebtedness of circa $150,000. Considerable property was attached, 1908, but a petition in bankruptcy, filed by sundry creditors, was defeated, circa June, 1908.

BUTTE CENTRAL COPPER MINING CO. **MONTANA.**

Office and mine: Butte, Silver Bow Co., Mont. Organized Apr. 17, 1906, under laws of Montana, with capitalization $1,000,000, shares $1 par. Apparently has some connection with the Butte Central & Boston Copper Corporation.

BUTTE CENTRAL COPPER MINING & SMELTING CO. **MONTANA.**

Mine office: Butte, Silver Bow Co., Mont. Organized February, 1906, under laws of Montana, with capitalization $2,500,000, shares $5 par. Ap-

parently is the parent company of the Butte Central & Boston Copper Co poration.

BUTTE COALITION MINING CO. MONTANA

Office: 42 Broadway, New York, N. Y. Mine office: Butte, Silver Bo Co., Mont. Thos. F. Cole, president; John D. Ryan, vice-president; Arth C. Carson, general manager; preceding officers, Urban H. Broughton, Cap Thos. Hoatson, Chester A. Congdon, Benj. B. Thayer, F. L. Ames and Wa Dixon, directors; J. W. Allen, secretary; Jas. O'Grady, treasurer; Ge Moulthrop, superintendent.

Organized Feb. 24, 1906, under laws of New Jersey, with capitalizati $15,000,000, shares $15 par. Retired, 1906-1907, bonds at 6% to amount $3,500,000, these being $2,500,000 bonds of Nipper Consolidated Copper C and $1,000,000 bonds of Montana Ore Purchasing Co. Paid initial divide Sept. 17, 1906, and to Dec. 31, 1907, had paid dividends of $2.45 per sha first dividend being 40 cents, 3 next 50 cents each, and last, December, 19 being 15 cents per share. Dividends were passed, first half 1908. Americ Trust Co., Boston, transfer agent. Old Colony Trust Co., Boston, registr Shares are listed on the Boston stock exchange. Net income, 1907, w $1,461,465, and company begun 1908 with cash, on hand and in ban $3,503,156, with liabilities of only $5,842. Company began business w $4,000,000 cash.

The Butte Coalition Mining Co. holds its properties through the R Metal Mining Co., which has direct title, but entire stock issue of the R Metal is owned by Butte Coalition, hence the property is described un this title, although the Red Metal is the operating company, in Butte.

The Butte Coalition was formed by the joint efforts of John D. R and Thos. F. Cole, to put an end to the desperate litigation that had ra for 7 years between the Amalgamated and Heinze interests. This end w effected, the Butte Coalition taking over all of the Heinze holdings exc La France Copper Co., properties and interests so taken over including Montana Ore Purchasing Co., Nipper Consolidated Copper Co., Guardian C per Co., Minnie Healy Mining Co., Belmont Mining Co., Johnstown Min Co., Hypocka Mining Co. and Corra-Rock Island Mining Co., in addition which the company owns a controlling interest in the Alice Gold & Sil Mining Co.

Lands are circa 145 acres, including various preponderant fractional terests, with a total of about 60 claims and fractional claims, also mine rights to 108 town lots in Butte, on one of which the Glengerry mine located. Principal properties are the Rarus group, Nipper group and Corra group, also a 38% interest in the Pennsylvania mine, of which Boston & Montana owns 62%, the Pennsylvania being described under t title of Boston & Montana. Properties turned over by the various Hein companies were largely interlocking fractional interests in various Hein properties.

Company's principal productive mines are in the Rarus group, whic includes the Minnie Healy, Rarus, Tramway and Snohomish mines. The Mi nie Healy, area circa 5 acres, is perhaps the best mine of the Butte Coalitio as matters now stand. The Minnie Healy adjoins the Leonard and Colus mines, the best properties of the Boston & Montana, and had a 2-compar ment 1,400′ shaft, connected underground with the Leonard, Rarus and Tra way mines, but shaft was lost through fire, 1907-1908, on the 600′ and 70 levels, and the mine is to be operated through the new Rarus shaft. T Minnie Healy shows a mineralized zone of 200′ to 300′ extreme width, carryi ore of excellent average grade.

The Rarus has a 3-compartment shaft, 2,000′ deep, August, 1908, which will operate the Minnie Healy, Tramway and Snohomish mines also. Ore body is not clearly defined, but is upwards of 300′ wide in places, and of good grade, averaging about 4% in copper tenor. Levels are opened at 200′ intervals, and the mine is timbered with square sets. Little stoping has been done below the 800′ level. A Webster Camp & Lane 32x32″ hoist operates 2 double-deck cages, with 6-ton skips swung under.

The Johnstown, area 6.66 acres, is a fractional claim lying next east of the Rarus, and is operated as part of the Rarus mine.

The Tramway, lying between the Minnie Healy and Rarus, owned one-third by Butte Coalition and two-thirds by the Butte & Boston Consolidated Mining Co., has a 3-compartment 1,700′ shaft, but will be operated partly through the new Rarus shaft. Mine shows a large body of very rich chalcocite on the 1,400′ level. Shaft has a 108′ steel headgear with 3 sheaves, and a 2,500-h. p. hoist.

The Snohomish mine, adjoining the Tramway, south of the Minnie Healy, is owned half and half by Butte Coalition and Butte & Boston, and is operated in connection with the Tramway.

The Mountain Chief claim, area 1.15 acres, lies next north of the Butte-Bankaava, and is said to have produced about $1,500,000 worth of ore, from a shallow shaft which was blown up by dynamite, under the Heinze regime, on account of litigation, injunctions and dynamite being the favored weapons of those happy days.

The Nipper group includes the Nipper, Chief Joseph, Balm and L. E. R. claims. The Nipper mine, area 15.18 acres, has 2 shafts, of circa 1,000′ and 1,200′ depth, with 12 exits, being connected underground with the Parrot, Never Sweat and Little Minah mines, and has been operated to some extent through the Parrot shaft. Mine is timbered with 10x10″ square sets.

The Belmont mine, adjoining the Anaconda and formerly having ore hoisted through the Anaconda shaft, has an 1,800′ shaft, cut down to 3 compartment size and retimbered. Upper levels showed ore rich in silver, with an impoverished zone at depth of circa 350′, but good ore shows again at 1,400′. The Belmont Mining Company turned over to the Butte Coalition many fractional interests, with claims aggregating 67½ acres, lying in the southeastern part of Butte.

The Corra group, turned over by the Corra-Rock Island Mining Co., includes the Corra and Rock Island mines, with a ninth interest in the Silver Queen, a third interest each in Robert Emmet I and II, a seventh interest in the Snoozer and a half interest in the Blackfoot. The Corra mine has a 2,200′ shaft, with mainly silver values above the 1,000′ level, below which the ore is low in copper and higher in silver than the average of the district. The area of the Corra-Rock Island group is circa 30 acres, including the Corra mine of 13.15 acres, Rock Island mine of 5.15 acres and Snoozer of 9.37 acres.

The Glengerry mine, having an 800′ shaft, has the mineral rights to many town lots in Butte.

Miscellaneous claims, slightly developed or practically virgin, owned in whole or part by the Butte Coalition, include the Little Ida claim, area 1 acre; Nightingale, area 1.3 acres; Sweitzer, area 3.5 acres; Highland Chief, area 12 acres; Mountain Chief No. 3, Black Diamond, Wild Goose, A. J. P., Hazley, Pompey, Montana, Clifton, Scottish Chief, Lioness, Kinkaid and Taffy.

The Alice property, controlled through stock ownership, is described under title of Alice Gold & Silver Mining Co.

The ore of the Butte Coalition is smelted under contract by both the

Boston & Montana and Anaconda smelters, going mainly to the Washoe sm

In September, 1907, production was reduced about two-thirds and suspended December 1st, until early spring. Production, 1907, was c 377,000 tons of ore, returning an average of 51.47 lbs. copper and up to oz. silver per ton, yielding 19,416,377 lbs. fine copper, 444,809 oz. silver 2,480 oz. gold. For 1906 ore treated gave average returns of 75.86 lbs. cop and 2.216 oz. silver per ton. About 10% of the ore mined is of smelt grade, averaging 9% in copper tenor, balance being concentrating ore. T various mines have a large amount of ore developed, and reserves are be added systematically, despite difficulties caused by the Minnie Healy fi The property has a maximum productive capacity of about 2,000 tons of daily, or circa 35,000,000 lbs. fine copper yearly, at a cost of about 10 ce per pound, and before the drop in metal prices, 1907, was yielding abo 1,600 tons daily. Costs, April, 1908, were said to be under 8.5 cents pound. Ores mined July, 1908, were said to average about 5% copper a $2 per ton in combined gold and silver values. The numerous properties the Butte Coalition are of greatly varying values, but include some excell mines, and the management is experienced, aggressive and capable.

BUTTE & COEUR D'ALENE MINING CO. MONTAN

Office: care of F. C. Robertson, Spokane, Wash. Mine office: Salt Missoula Co., Mont. Organized circa July, 1907, under laws of Washingt with capitalization $1,500,000, shares $1 par. Lands, 9 claims, adjoining Boston-Colby, having a 670′ crosscut tunnel showing a vein carrying oxida copper ores of low average tenor and a 2′ vein of silver-lead ore assaying to 10% lead and 100 oz. silver per ton.

BUTTE COMMERCIAL COPPER MINING & DEVELOPMENT CO. MONTA

Dead. Formerly at Butte, Silver Bow Co., Mont. Described Vol. VI

BUTTE CONSOLIDATED COPPER CO. MONTA

Letter returned unclaimed from former office and mine, Butte, Si Bow Co., Mont. Capt. Alvin P. Nipgen, president; Robt. J. Buckley, president; Frank M. Douglass, secretary and treasurer; preceding officers, W. R. Lincoln and S. H. Johnson, directors. Organized Jan. 12, 1906, u laws of Montana, with capitalization $6,000,000, shares $1 par. Lands claims, area circa 500 acres, including 10 patented claims, known as the S group, adjoining the Butte & Bacorn on the north, having a 225′ tunnel a 2-compartment 150′ shaft, latter very wet. Idle.

BUTTE CONSOLIDATED COPPER MINING CO. MONTA

Office: care of D. D. Twohy, president, Butte, Silver Bow Co., M Mine office: Corbin, Jefferson Co., Mont. Martin Mulvahill, vice-presid preceding officers, C. D. McCarthy, T. J. Walsh and C. R. Grunwall, direc Organized June 30, 1906, under laws of Montana, with capitalization $600 shares $1 par. Lands, northeast of the Corbin-Wickes, have a 300′ shaft crosscut, seeking the Bertha vein, which has developed a little sulphide giving assays of 30 oz. silver. Has steam power.

BUTTE CONSOLIDATED MINING CO. MONTA

Dead. Property, known as the Red Lake Placers, including the mine, is now held by the British Butte. Was promoted by J. Br Goode, presumably the same as Jas. B. Goode, better known as "Jimmy Good," a notorious mining swindler of St. Louis. Formerly at Butte, Si Bow Co., Mont.

BUTTE CONTINENTAL COPPER MINING CO. MONTA

Office and mine: Butte, Silver Bow Co., Mont. Dr. G. E. Blackb president; J. Bruce Kremer, vice-president; E. J. Baker, treasurer; C.

cretary; preceding officers and Fred Tomek, directors. Organized 1907, with capitalization $1,000,000. Lands, 8 claims, area 160 tly patented, on the continental divide, about 5 miles east of Butte, a big vein, on which it is hoped that commercial ore may be found 500' depth. The Maryland claim has shafts of 50' and 150', latter about 4' of ore giving assays of 3 to 8% copper.

COPPER CO. **MONTANA.**

. Held bonds on the Jessie and other claims. No relation to present pper Co. Formerly at Butte, Silver Bow Co., Mont.

COPPER CO. **MONTANA.**

e and mine: Butte, Silver Bow Co., Mont. Organized March 13, th capitalization $1,500,000, shares $1.50 par. Is controlled, through nership, by the Butte Copper Montana, and apparently is a twin of e Copper Mining Co.

COPPER BELT MINING CO. **MONTANA.**

d. Formerly at Butte, Silver Bow Co., Mont. Described Vol. VI.

COPPER EXPLORATION CO. **MONTANA.**

d. Formerly at Butte, Silver Bow Co., Mont. Fully described Vol. VI.

COPPER KING MINING CO. **MONTANA.**

er returned unclaimed from former office and mine, Butte, Silver , Mont. Organized Apr. 19, 1906, under laws of Montana, with capin $1,500,000, shares $1.50 par. Lands, 3 fractional claims, area 28 est of the Jennie Dell mine. In August, 1906, was said to plan sinkhaft on the Missouri Girl claim, but nothing since heard of the prohaft.

COPPER MINING CO. **MONTANA.**

ce and mine: Butte, Silver Bow Co., Mont. Organized March, 1906, pitalization $1,500,000, shares $1.50 par. Is controlled, through owner- majority of stock, by Butte Copper Montana, latter being practically anization of the Butte Copper Co. Apparently is a twin of the Butte Co.

COPPER MINING & SMELTING CO. **MONTANA.**

ad. Formerly at Butte, Silver Bow Co., Mont. Described Vol. V.

COPPER MONTANA. **MONTANA.**

ice: 42 Broadway, New York, N. Y. Letter returned unclaimed from mine office, Butte, Silver Bow Co., Mont. C. E. Burrelle, president; Sherman, vice-president; John MacGinnis, general manager; W. L. , treasurer; preceding officers and W. L. Moyer, directors; Robt. Hausuperintendent. Organized Dec. 1, 1906, under laws of Maine, with ation $1,750,000, shares $1 par. Trust Company of America, New transfer agent. Was practically a reorganization of the Butte Copper Co., but apparently was formed without the knowledge of the Butte of the old company's lands and without notice to shareholders, plan motion seeming decidedly devious. Controls, through stock ownership, tte Copper Co. and Butte Copper Mining Co. Lands, owned or claimed wned, apparently are the Trifle, Anselmo 1 and 2, and a part interest ert Emmet 1 and 2. Lands lie just west of Missoula Gulch, there total of 5 patented claims, area circa 35 acres, but the Butte Copper Co. apparently claims to own these lands outright. Lands are supo carry the Gagnon and Stewart veins, the North Anselmo vein supbeing an extension of the Gagnon. Properties have produced about 0 in gold and silver, mainly in the latter, some bonanza ore in the past up to 9,000 oz. silver per ton. Principal development is on the Trifle which has a 700' shaft, planned to be sunk to 1,000' depth, which cut

a large vein at depth of 375′, this giving assays of about 4% copper f selected ores. Machinery plant is good for 1,000′ depth. The Emmet cla have a 300′ shaft, said to show 7% copper in the bottom when former o ators were driven out by water and lack of cash. Work suspended J 1907. Is not regarded favorably.

BUTTE COPPER & ZINC CO. MONTAN

Mine office: Butte, Silver Bow Co., Mont. Alvin L. Strasburger, pr dent; A. J. Seligman, vice-president; A. L. Bailey, secretary and treasur preceding officers, C. A. Wimpfheimer, Dr. Maurice Eisenberg, Bernard Nau burg, W. L. Moyer and V. Thiegeberg, directors. Organized Nov. 28, 19 under laws of Maine, with capitalization $2,500,000, shares $5 par, practical as a reorganization of the Montana Zinc Co. Property is the Emma mi which has proven a hoodoo to all of its possessors, and has brought to fina cial grief every company that ever attempted working it. Idle, and financ practically exhausted in paying for property.

BUTTE & CORBIN CONSOLIDATED COPPER MINING CO. MONTAN

Office: Butte, Mont. Mine office: Corbin, Jefferson Co., Mon Matthew Dunn, president; Lee Dever, vice-president; J. B. Fitzpatrick secretary and treasurer. Organized April, 1907, under laws of Montan with capitalization $700,000, shares $10 par. Lands, 5 claims, on th eastern side of Valparaiso Mountain. Development was interrupted by a su of the Copper Mountain Mining & Smelting Co., decided April, 1908, in fav of the Butte & Corbin.

Development is by the Rarus tunnel, said to show an 11′ vein assayin 2.5% copper, with a 4′ paystreak carrying mainly covellite, assaying 6% co per, 8 oz. silver and $3 gold per ton. Is said to plan a new machinery plan

BUTTE-CORBIN COPPER CO. MONTAN

Office: care of R. P. Barclay, Butte, Mont. Mine office: Corbin, Jeffers Co., Mont. Organized Dec. 1, 1906, under laws of Montana, with capitalizati $500,000, shares $1 par. Lands, sundry claims in the Corbin district, said show 7′ of high grade ore.

BUTTE-CURTIS & MAJORS COPPER MINING CO. MONTAN

Office and mine: Butte, Silver Bow Co., Mont. Geo. D. Curtis, manag Organized Sept. 20, 1906, under laws of Montana, with capitalizat $1,000,000, shares $2 par. Lands, in the southern part of Butte, have a sh circa 200′ deep. Presumably idle.

BUTTE & DULUTH COPPER CO. MONTA

Office: care of Julius D. Howard, Duluth, Minn. Mine office: Bu Silver Bow Co., Mont. Preceding officer, Fred Stroh, J. D. Welcome, C Stroh and Wm. Burrell, directors. Organized 1906, under laws of Mont with capitalization $1,000,000, shares $1 par. Property was an option sundry lands in the Butte district.

BUTTE & ELLISTON GOLD & COPPER MINING CO. MONTA

Office: care of Patrick Wall, Butte, Mont. Letter returned unclai from former mine office, Elliston, Powell Co., Mont. Said, 1907, to be pay quarterly dividends of 1½ cents per share. Mine, 6 miles from Ellis circa 300′ deep, shipped ore, 1907, averaging about 8% copper, 17 oz. si and $10 gold per ton. Employed circa 25 men at last accounts.

BUTTE & ELY COPPER CO. NEVA

Office: 130 Pennsylvania Bldg., Butte, Mont. Mine office: Ely, W Pine Co., Nev. F. L. Melcher, president; Malcolm Gillis, vice-president; C L. Scott, secretary; John L. Carroll, treasurer; preceding officers, Dr. Tom Moore and E. F. Pelton, directors; J. B. Leggat, managing director. Org ized July 27, 1905, under laws of Montana, with capitalization $500,000, sh

par. Stock was made assessable in 1907. Lands, 12 claims, area 210 acres, ng between the Nevada Consolidated and Giroux Consolidated, have shafts 200', 200' and 300', latter with steam hoist, showing sulphide ore of low or, but of some promise, in all shafts. Property includes a water-right, miles distant, said to be capable of supplying 2,000,000 gallons daily. Sus- ded operations late 1907.

TTE EXEMPTION COPPER CO. **MONTANA.**

Office: Spokane, Wash. Letter returned unclaimed from former mine of- e, Butte, Silver Bow Co., Mont. Wm. A. Nicholls, president; F. J. Finu- ne, treasurer; Geo. Seely, secretary; N. E. Linsley, consulting engineer. rganized May 20, 1906, under laws of Maine, with capitalization $2,500,000, ares $1 par. Knickerbocker Trust Co., New York, registrar. Trust Co. of merica, New York, transfer agent. Lands are the Mountain Spur claim and ⅝ interest in the Colleen Bawn, Canyon and Exemption claims, other fourth eing owned by Butte Coalition Mining Co. Lands lie east of the Bull- hacker, and a tunnel on the Exemption claim has shown a small vein giving re assaying 5% copper.

UTTE & FURNACE CREEK COPPER MINING CO. **CALIFORNIA.**

Dead. Organized 1906; name changed, circa September, 1906, to Furnace Creek Extension Copper Co. Formerly at Greenwater, Inyo Co., Cal.

UTTE-FURNACE RANGE COPPER CO. **CALIFORNIA.**

Office: care of Jos. H. Vivian, Butte, Mont. Mine office: Greenwater, Inyo Co., Cal. Dr. H. D. McDonald, president; A. H. Mueller, secretary and treasurer. Organized June 15, 1906, under laws of Montana, with capitaliza- tion $1,000,000, shares $1 par. Lands, 4 claims, adjoining the Furnace Creek Copper Co.

UTTE GOLD, SILVER & COPPER CO. **WASHINGTON.**

Office: Spokane, Wash. Lands are about 25 miles from head of Lake Chelan, Washington, showing 2 veins, one 8' wide, opened by tunnels. Idle and apparently moribund.

UTTE GREEN COPPER CO. **MONTANA.**

Office and mine: care of Samuel A. Hall, general manager, Butte, Silver ow Co., Mont. Organized February, 1906, under laws of Montana, with apitalization $500,000, shares $1 par. Lands include the Green claim, near he Belmont mine of the Butte Coalition. Employed about 20 men, and was laimed to be producing 15 to 20 tons of good copper ore daily, in March, 907, but shortly later dropped out of sight.

UTTE & GREENWATER COPPER CO. **CALIFORNIA.**

Office: care of Wallace Corbett, president, Butte, Mont. Mine office: Greenwater, Inyo Co., Cal. Daniel P. Murphy, vice-president; J. V. Shaw, ecretary; O. O. Kinkaid, treasurer; preceding officers, John Adams and R. P. Kelley, directors. Organized October, 1906, under laws of South Dakota, with apitalization $1,500,000. Lands, 10 claims, near the center of the Green- ater district, showing 6 veins giving assays up to 6% copper. Has a 60' haft. Idle.

UTTE-HERCULES COPPER CO. **MONTANA.**

Office and mine: Butte, Silver Bow Co., Mont. Thos. F. Stephens, presi- ent; D. J. Charles, vice-president; C. M. Parr, secretary; Geo. E. DeSnell, reasurer; preceding officers, Emil H. Renisch and C. S. Passmore, directors. rganized 1906, with capitalization $2,500,000. Lands, 10 claims, near the old Trenton concentrator, in the southwestern portion of the Butte district, lightly prospected by a 75' crosscut tunnel, said to show a 55' vein with 18" aystreak carrying medium grade values in copper, lead, silver and gold. unk a 100' shaft and suspended operations February, 1907.

BUTTE HILL COPPER MINING CO. MON

Office: 1538-42 Broadway, New York, N. Y. Mine office: Butte, Bow Co., Mont. James Higgins, president; Dr. Maurice Eisenberg president. Organized Apr. 18, 1906, under laws of Montana, with cap tion $5,000,000, shares $5 par. Lands, 11 claims, area 173 acres, in a veloped district north of Walkerville and about 1 mile from previous attempts. Has a 200′ shaft, cutting a vein of 40′ estimated width, sho few stringers and bunches of ore assaying up to 3% copper and 20 oz. per ton. Idle at last accounts.

BUTTE & IDAHO GOLD & COPPER MINING CO. I

Mine office: Salmon, Lemhi Co., Idaho. Wallace Corbett, president; Desourdy, vice-president; Dr. W. H. Haviland, secretary and treasurer; Emery, assistant secretary and treasurer. Lands, 6 claims, a millsite water right, on the northern fork of Carmen Creek, near Salmon, ha 207′ tunnel cutting a 6′ vein carrying medium grade auriferous and iferous copper ore, with other tunnels of 75′ and 150′ showing oth bodies, mine having a total of 600′ of workings.

BUTTE & IOWA MINING CO. MON

Mine office: Butte, Silver Bow Co., Mont. Apparently moribund.

BUTTE-KNICKERBOCKER MINING CO. MON

Office and mine: Butte, Silver Bow Co., Mont. Geo. B. Conaway president and general manager; preceding officer, B. F. White; Geo. H. R Samuel H. Treloar and Thomas Davidson, directors. Organized Nov. 27 under laws of Montana, with capitalization $5,000,000, shares $5 par.

Lands are in 3 groups, the main group of 4 claims including the Dell, Twilight, October and La Monta claims, lying west of the Lex and of Missoula Gulch. The Jennie Dell has a 450′ shaft, showing, at 358 ledge, supposedly the continuation of the Lexington vein, carrying abo copper, with small gold and silver values. Company is said to plan sin 200′ shaft on the La Monta claim.

The Determination group of 14 claims, said to have been secured 1908, lies west of the Butte & Bradley and northwest of the Butte & B

The Golden Leaf group, secured 1908, under a 2-year bond and consists of 20 claims, near Bannock, Beaverhead county, Montana, a cludes the Montana and Old Gold mines, latter having a mill, which planned to remodel.

BUTTE LODE EXTENSION MINING CO. MON

Office and mine: Butte, Silver Bow Co., Mont. John MacGinnis, dent; Chas. S. Warren, vice-president; John M. Murphy, secretary; C. J. treasurer; preceding officers and Jos. Russell, directors. Organized A 1906, under laws of Montana, with capitalization $500,000, shares $ Lands, 4 claims, known as the St. Angus group, 12 miles northeast of having a 150′ shaft with a crosscut showing 2 veins.

BUTTE & LONDON COPPER CO. MON

Dead. Organized 1905 and name changed, 1906, to Butte & London Development Co. Formerly at Butte, Silver Bow Co., Mont.

BUTTE & LONDON COPPER DEVELOPMENT CO. MON

Office and mine: 46 East Broadway, Butte, Silver Bow Co., Mont. Theo. Brantley, president; James H. Lynch, vice-president; W. E. Re secretary; Alex. Johnston, treasurer; preceding officers, James A. Talbot Anderson, Charles F. Booth, W. W. McDowell, Charles J. Kelly, Guy W. ton, B. F. White and Herman B. Eisenberg, directors; T. H. Emery, as secretary; Thos. W. Heather, superintendent. Organized, 1905, under l Arizona, with capitalization $5,000,000, shares $5 par, as the Butte & B

pper Co.; title changed April, 1906. Company reported, circa June 1906, ets of $5,439,527.08, including cash and stock in the treasury, but suspended erations 1907 from lack of funds.

Lands, 113 acres, known as the Greendale placer claims, lying immediately rth of the Pittsburg & Montana, and stated by management supposedly to arry the eastern extension of the veins of the North Butte, which is a rather markable claim, considering that the North Butte veins have as yet given o indications of a desire to turn at right angles in order to dive under the Greendale placers.

Development is by a 3-compartment 1,130′ shaft. North and south crosscuts on the 1,100′ level are said to show several veins, one up to 20′ in width, the southern crosscut showing ore assaying 2% copper, 50 oz. silver and $2 gold per ton, but no commercial ore has been developed.

Equipment includes four 125-h. p. boilers, Corliss double-conical drum hoist and a 5-drill air-compressor. Company in bad shape financially, at last accounts, and apparently under the necessity of raising fresh funds or reorganizing. Property, while not devoid of promise, is outside the proven ore zone of Butte.

BUTTE & MADISON MINING CO. **MONTANA.**

Mine office: Rochester, Madison Co., Mont. Has a 150′ two-compartment shaft.

BUTTE & MICHIGAN MINING CO. **MONTANA.**

Office and mine: care of Dr. Wm. S. Bishop, Butte, Silver Bow Co., Mont. Organized Apr. 28, 1906, under laws of Montana, with capitalization $1,000,000, shares $1 par. Lands, in Leslie Gulch, 6 miles southeast of Butte and only 1½ miles southeast of the poor farm, have a 250′ shaft on the Julian claim. Presumably idle.

BUTTE-MILWAUKEE COPPER CO. **MONTANA.**

Office: care of G. M. Minzesheimer & Co., New York, N. Y. Mine offices: Owsley Blk., Butte, Silver Bow Co., Mont., and Argenta, Beaverhead Co., Mont. John F. Cowan, president and manager; B. E. Calkins, vice-president; C. H. Smith, secretary and treasurer; John H. Mills, superintendent. Organized March 28, 1906, under laws of Montana, with capitalization $3,000,000, shares $2 par. Is controlled, through ownership of about 80% of issued stock, by Butte & New York Copper Co., which exchanged 304,000 shares of its stock for 760,000 shares of treasury stock of the Butte-Milwaukee, there being some complaint by shareholders over this deal.

Lands, 6 claims, near the Butte & Argenta, at Argenta, on which apparently no work has been done, and 5 adjoining claims, known as the Pollock, Col. Sellers, Bird, Florence and Stonewall, about a mile north of the North Butte. Final payment on the Butte claims is due February, 1909.

The Pollock mine is said to have produced $400,000 worth of ore, some years ago, mainly in gold and silver, though a little ore running 2% copper and 15 oz. silver per ton, with small gold values, was produced, 1906, by present owners. The Pollock has 4 veins, of which 2 are developed by a short tunnel and 730′ shaft. Equipment includes a 5-ton Nordberg first-motion hoist, good for 2,000′ depth.

The Col. Sellers mine, having a 605′ shaft, is said to give promising surface indications. The Florence also has a shallow shaft. Work was resumed circa April, 1908, after some months idleness.

BUTTE MINE & EXPLORATION CO. **MONTANA.**

Dead. Formerly at Butte, Silver Bow Co., Mont. Described Vol. VI.

BUTTE MINES EXPLORATION CO. **UTAH.**

Office: care of Wallace Corbett, director, Butte, Mont. Letter returned unclaimed from former mine office, Tecoma, Elko Co., Nev. Capitalization, $1,500,000. Lands are in Box Elder county, Utah, near the Nevada line.

BUTTE MINING & DEVELOPMENT CO. MONT

Dead. Formerly at Butte, Silver Bow Co., Mont. Described Vol. II.

BUTTE MONITOR TUNNEL MINING CO. MONT

Office: care of C. W. Pomeroy, vice-president, 63-263 La Salle St., Chi Ills. Letter returned unclaimed from former mine office, Butte, Silver Bow Mont. Wm. S. Switzer, president, secretary and treasurer. Capitaliza $3,750,000, shares $1 par. Lands, 7 claims, area circa 102 acres, opened tunnels of 300′ and 1,300′, showing chalcopyrite averaging about 2% co and 2 oz. silver per ton, with small gold values. Idle for some years.

BUTTE MONTANA MINING CO. MONTA

Mine office: Butte, Silver Bow Co., Mont. T. M. Barnsball, presid J. T. Browning, vice-president; W. H. Lindsay, secretary, treasurer and ge manager; preceding officers, F. J. Bennett, J. K. McMullen, John B. Chat and C. W. Whitcomb, directors. Organized Feb. 13, 1906, under laws Montana, with capitalization $1,000,000, shares $1 par. It is reported F. Augustus Heinze is in control, but this is not credited.

Lands include the Alexander Scott and Little Annie claims. The A Scott, said to be owned outright, is a fractional claim of about 5 acres a adjoining the West Colusa mine on the north, having about 500′ of the st of 4 veins, opened by a 1,050′ shaft, showing on the 600′ level an 18″ pay str of high grade ore, mainly chalcocite, and it is claimed that $1,000,000 w of ore has been blocked out on this level. In April, 1908, leasers were shipp to the Pittsmont smelter, 75 to 100 tons weekly, of ore said to run 20% to copper, with good gold and silver values, taken from the 600′ level. The Bo & Montana did some sinking, 1908, in the Alex. Scott shaft, for the pur of reaching the fire zone in the Leonard and Colusa mines.

The Little Annie claim, lying between the Goldsmith and Little Geo claims, northwest of Walkerville, has 200′ shaft, and is idle.

The Alex. Scott claim is most excellently located, and scarcely can to make a good mine, if properly developed. A reorganization is said t planned.

BUTTE & NEW YORK COPPER CO. MONTA

Office: care of G. M. Minzesheimer & Co., New York, N. Y. Mine of Butte, Silver Bow Co., Mont. Jas. A. Talbot, president; Harry E. Mitte and Wm. L. Moyer, vice-presidents; B. Binnard, secretary; Lee Schlesi treasurer. Organized circa October, 1906, under laws of South Dakota, capitalization $4,000,000, shares $5 par. Is a holding company only, contro the Butte-Milwaukee Copper Co. through ownership of about 80% of issue, having exchanged 304,000 shares of Butte & New York for 760,000 sh of the treasury stock of the Butte-Milwaukee, there being some complaint the transfer by shareholders of the latter. Is said also to control, through stock ownership, the Montana Consolidated Copper Co. Suit was bro April, 1907, for a share of the partnership profits of promotion by Joh McIntyre and Wm. Snidow.

BUTTE-NEW YORK COPPER CO. MONTA

Dead. New Jersey charter forfeited, 1903, account of unpaid taxes. merly at Butte, Silver Bow Co., Mont.

BUTTE NORTHERN COPPER CO. MONTA

Dead. Lands sold, 1906, to Butte Central & Boston Corporation. merly at Butte, Silver Bow Co., Mont. Described Vol. VI.

BUTTE-POTOSI MINING CO. MONTA

Mine office: Pony, Madison Co., Mont. Organized Dec. 1, 1906, under of Montana, with capitalization $1,000,000, shares $1 par. Has a 740′ tu showing stringers of argentiferous copper sulphides assaying up to 25% co and 21 oz. silver per ton with traces of gold. Idle early 1908, but said to resumption.

RANGE COPPER MINING CO. **MONTANA.**
: care of Geo. B. Conway, Butte, Mont. Organized Dec. 2, 1906, s of Montana, with capitalization $1,000,000, shares $1 par.

RED EAGLE COPPER CO. **MONTANA.**
and mine: care of A. A. McMillan, Butte, Silver Bow Co., Mont. circa May, 1907, under laws of Montana, with capitalization shares $5 par, by J. D. Slemons, Fayette Harrington, et al. Lands, 6 theast of the Butte & Bacorn, opened by a tunnel, circa 400′ long, l Eagle claim, showing little or no ore.

EDUCTION WORKS. **MONTANA.**
by Colusa-Parrot Mining & Smelting Co.

UT GOLD & COPPER MINING CO. **ARIZONA.**
Formerly at Humboldt, Yavapai Co., Ariz.

ST. LOUIS MINING CO. **MONTANA.**
Formerly at Butte, Silver Bow Co., Mont. Fully described Vol. VI.

SPOKANE MINING CO. **MONTANA.**
care of Patrick Clark, Spokane, Wash. Mine office: Butte, Silver Mont. Organized 1905, to take over sundry claims at Butte. Ap- ceeded by Bullwhacker Copper Co.

TANDARD COPPER MINING CO. **MONTANA.**
and mine: 51 East Broadway, Butte, Silver Bow Co., Mont. W. resident; Hon. C. E. Nolan, vice-president; T. E. Collins, treasurer; officers, J. L. Templeman and A. M. Stevens, directors. Organized 1907, under laws of Montana, with capitalization $1,000,000, shares

SUMMIT VALLEY COPPER MINING CO. **MONTANA.**
and mine: Butte, Silver Bow Co., Mont. C. D. Joslin, vice-presi- A. Talbott, treasurer; J. W. Thomas, secretary; H. H. Taft, super- Organized Apr. 9, 1906, under laws of Montana, with capitaliza- ,000, shares $5 par. Lands, 5 claims, area 67 acres, in Saratoga theast of Butte, near the Ida-Montana, having 2 shafts, deepest 500′. diamond drilling early 1908.

SUPERIOR COPPER CO. **MONTANA.**
Duluth, Minn. Mine office: Butte, Silver Bow Co., Mont. Capt. B. Wolvin, president; presiding officer, Archibald M. Chisholm, W. Arthur H. Wethey, John F. Killoran and Thos. J. Davis, directors; kowsky, consulting engineer; R. C. Davis, superintendent. Organ- st, 1906, under laws of Arizona, with capitalization $6,000,000, shares onds, $500,000, first-mortgage, at 8%, authorized; issued, $201,000. 6 claims, including the Black Rock, Niagara, Raymond and Old es. Principal property is the Black Rock, which had a 500′ shaft een cut down to 3-compartment size, and was 1,175′ deep July 1, e Black Rock carries an exceptionally strong vein, ranging 50′ to dth, with mainly silver values, but with ore up to 3% in copper he 300′ level, with mainly zinc ore showing below. It is believed nagement that the zinc will be replaced, at considerable depth, by n of ore of commercial grade. The Black Rock shaft has a 60′ gal e.

Niagara mine, worked by leasers, 1907, produced a little ore carry- 200 oz. silver per ton.

lant at the Black Rock is exceptionally good, including 7 boilers, a ouble-drum hoist good for 2,000′, air-compressor and a small electric ildings include combined engine-house and boiler-house, of steel and ood carpenter shop and other necessary mine structures. Company

plans to complete the electrification of its works, holding the steam plan reserve as an auxiliary.

Production was suspended, late 1907, because of refusal of smelter buy ore from leasers. Company has secured several extensions of paym due on its bond. The directorate includes a number of experienced and cessful mining men. The property is outside the proven copper zone of Bu but if the popular theory is correct, and zinc ore is succeeded by copper depth, the Butte & Superior has excellent prospects of making a good mine

BUTTE & VERONICA COPPER MINING CO. MONTA

Letter returned unclaimed from former mine office, Butte, Silver B Co., Mont. John F. Hogan, Maurice Lenihan, M. H. McNulty, John J. Leni and Lewis P. Forestell, directors. Organized Apr. 20, 1906, under laws Montana, with capitalization $1,500,000, shares $2.50 par. Lands, 2 cla area 12 acres, west and south of the Belmont, opened by shafts of 70' and Shipped a little ore, 1906, ranging 5 to 10% copper tenor. Idle.

BUTTE & WALKER LAKE MINING CO. NEVA

Office: Butte, Silver Bow Co., Mont. Mine office: Loma, Esmeralda Nev. Carroll E. Dolan, secretary and treasurer; F. A. E. Starr, superintend Lands, 3 miles south of Loma, are said to show, at 60' depth, a 50' vein granite, carrying melaconite, malachite and chalcopyrite assaying 4.5% co and $1 gold per ton.

BUTTE-WALLACE COPPER & SILVER MINING CO. IDA

Mine office: Wallace, Shoshone Co., Idaho. Has 2 tunnels on a vein to be 15' to 35' wide, with a 2-compartment blind shaft sunk from the lo level, showing ore giving assay values in copper and silver.

BUTTE-WALL STREET MINING CO. MONTA

Office: care of Geo. Benjamin, secretary, Boulder, Mont. Preceding of W. G. Northrop, E. L. Deno and F. H. Benjamin, directors. Organized May, 1907, with capitalization $1,500,000. Lands, adjoining the Balti mine, are said to show an 8' ore body.

BUTTE & WASHINGTON MINING CO. WASHINGT

Mine office: Orient, Stevens Co., Wash. Lands, at Hall Bridge, Orient, have 2 tunnels, lower circa 200' long, said to show bornite and ch pyrite associated with argentiferous galena and sphalerite.

BUTTE-YERINGTON MINE. NEVA

Mine office: Yerington, Lyon Co., Nev. Lands, south of the Co Mountain mine, have a 145' shaft.

BUTTON GOLD MINING CO. ARIZO

Dead. Formerly at Minnehaha, Yavapai Co., Ariz.

BY-CHANCE COPPER CO. NEW MEXI

Office: 517 Francis St., St. Joseph, Mo. Mine office: Orogrande, O Co., N. M. Geo. J. Greene, president; Geo. A. Guild, vice-president; T. Travis, secretary-treasurer; preceding officers, Ben Phillips and E. C. K directors; Jas. J. Murray, general manager; I. Bohanna, mine superintende H. D. Reynolds, engineer. Organized March 29, 1906, under laws of N Mexico, with capitalization $2,000,000, shares $10 par; $1,000,000 iss Officers and shareholders are closely connected with the Southwest Smelt & Refining Co. Annual meeting, first Thursday after first Tuesday in Ma Lands, 4 claims, area 80 acres, in the Silver Hill district, showing two tact veins between granite and limestone, carrying chalcocite and chalco rite, estimated to average 3% copper, associated with pyrite, in a main of 25' estimated average width, opened by shafts of 25', 30' and 90', wit total of 325' of workings, estimated to give 10,000 tons of ore blocked out stoping. About 250' of diamond drilling has been done. Has a 35-h. p. st plant, with 3 mine buildings. Property is 3 miles from the Southw

, to which ore is sent for reduction, cost of mining and transporting g estimated by company at $2 per ton.

EL CABALLO. **MEXICO.**

e office: Indé, Durango, Mex. Wm. Benton, owner. Has cupriferous res and steam power. Presumably idle.

IAS CONSOLIDATED COPPER CO.

ce: care of A. H. Rose, vice-president, 186 First Ave., San Francisco, cation of property, if any, not learned.

CABEZAS DEL PASTO. **SPAIN.**

ned by Sociedad Colectiva C. & J. Sundheim.

ET RANGE MINING CO. **IDAHO.**

ce: care of Hon. Wm. C. Maybury, Detroit, Mich. Mine office: Priest Kootenai Co., Idaho. Lands, difficult of access, near the Priest Lake Co., are on the west side of Priest River, about 10 miles north of Lake, carry silver-lead and silver-copper ores, former carrying values in silver, running up to 87 oz. per ton, and latter assaying up to 26% 1% lead and 100 oz. silver per ton.

CONSOLIDATED MINING CO. **MONTANA.**

ce: care of Fred W. Bacorn, Butte, Mont. Mine office: Cable, Deer Co., Mont. Property includes the Cable gold mine and other properties, 0 miles west of Anaconda, former having copper ore, opened 1906, on nel level, this carrying an excess of iron, rendering it valuable for . Up to Feb. 15, 1907, had shipped 541 tons of copper ore averaging copper to the Washoe smelter. Suspended operations late 1907, be- f a Pittsburg bank failure, and resumed circa August, 1908.

ALES COPPER SYNDICATE, LTD. **SPAIN.**

ad. Liquidated, voluntarily, 1906.

CENIO CABRERA. **MEXICO.**

ice and mine: Guachinango, Jalisco, Mex. Lands, 30 hectares, show- ge ore bodies, carrying values in copper, silver and gold. There are ld workings, with limited development of a recent date. Idle at last ta.

ERA MINING CO. **MEXICO.**

ad. Formerly at Velardeña, Cuencamé, Durango, Mex.

LLONA DEVELOPMENT CO. **MEXICO.**

ice: Calumet, Mich. Operating office: Douglas, Ariz. Mine office: ras, Arizpe, Sonora, Mex. Thos. H. Collins, president and manager; Jas. Hoatson, vice-president; Capt. Thos. Hoatson, secretary and treas- Edw. McFarland, superintendent. Organized 1907, with capitalization 0, shares $10 par.

nds, circa 2,000 hectares, extending from a point 16 miles south of s to a vicinity immediately north of Fronteras, including the Sant Rosa area 126 hectares, 3½ miles from the Nacozari railroad, showing 3 veins, between porphyry and limestone, carrying ores reported by for- ners to assay up to 37% copper, 35% lead and 20 oz. silver per ton, nall gold values, which figures are too high. Development is by 5 short and 5 shafts, No. 1 being 350′, and No. 3 being 300′ deep, showing of ore in leached iron, with a 50′ ore body on the 200′ level. Equip- ncludes a good machinery plant, with a 50-h. p. engine, and about a mine buildings. Former owners shipped a little ore to the Douglas . Formerly employed circa 35 men, but company is understood to have ered bond and to have dismantled the plant.

O CACERES. **CHILE.**

e office: Pueblo Hundido, Antofagasta, Chile. Property is El Manto

Tres Gracias, formerly a considerable producer, but reduced, 1903, to sel of rich ore from old dumps. The mine, however, shows large bodies o to medium grade ore, and might become an important producer, if given quate transportation facilities, now lacking.

MINAS y FUNDICION DE CACOMA. MEX

Is the Mexican incorporation of the Cacoma Mining & Smelting Co.

CACOMA MINING & SMELTING CO. MEX

Office: 820 Security Bldg., St. Louis, Mo. Mine office: Autlán, Ja Mex. D. P. Richardson, president and treasurer; John Dee, vice-pres and general manager; John Nesserly, secretary; John Mann, mine superin ent; M. E. Raines, smelter superintendent. Organized under laws of Ari with capitalization $1,000,000, shares $10 par, and protocolized in Mexico.

Lands are various groups in vicinity of Autlán, showing mainly fi veins in diorite, of 5′ to 50′ width, carrying silver-lead ore and aurif chalcopyrite, principal values apparently being in lead and zinc. One was worked to shallow depth, and length of nearly 3,000′, for gold, by a vious owner.

The Volcancillos mine, area 28 hectares, 12 miles west of Autlán, w is the principal property, shows a vein of 8 meters estimated average wi carrying chalcopyrite assaying 3 to 22% copper and $4 to $12 gold per opened by about 1,000′ of tunnels and shafts. Massive chalcopyrite from paystreaks formerly was selected and matted, copper therefrom being sol native metal workers in the neighborhood.

The Purisima mine, area 24 hectares, 12 miles west of Autlán, has vein of auriferous chalcopyrite, opened by circa 400′ of tunnels, and is to have produced $60,000 in gold from oxidized surface ores.

El Paso mine, area 40 hectares, 12 miles west of Autlán, shows a vein, opened by a 150′ shaft, carrying copper, lead, silver and gold, va being mainly in silver-lead.

La Veta Grande mine, area 60 hectares, 30 miles west of Autlán, ne proposed railway line, is said to have a 200′ vein showing bornite at sur and chalcopyrite at depth, both auriferous. Several thousand horse powe available from the Autlán River at this point.

The Palestina mine, area 8 hectares, 12 miles west of Autlán, has a of 6 meters' width, opened by tunnels showing auriferous copper ore, free gold has been taken, in considerable quantities, from surface workings

The Olvidado mine, area 4 hectares, 12 miles west of Autlán, has a vein of auriferous copper ore, slightly developed by tunnel.

The San Luis mine, area 2 hectares, 12 miles west of Autlán, carries low grade argentiferous ore, valuable mainly for fluxing.

El Cajon mine, area 8 hectares, 12 miles west of Autlán, slightly develo by shaft, has a 25′ vein of hematite, carrying silver and copper values, us mainly for fluxing.

Miscellaneous properties are La Junta, area 6 hectares; San Carlos, hectares; San Juan, 15 hectares; San José, 40 hectares; Anaconda, 11 hecta El Tigre, 75 hectares, and Ouelitlán, 30 hectares. More or less work has b done on all of these properties, which are antiguas, formerly worked al the sulphide zone.

Mining equipment includes a steam plant, with boilers, pumps, etc.

Reduction works consist of a 10-ton mill and a 10-ton smelter, latter parently left by former owners. Mill has a crusher, rolls and jigs, but smelter is entirely inadequate for profitable production. Company is in li tion, with affairs considerably snarled, former owners alleging company's ure to comply with contract. Property considered valuable.

DEVELOPMENT CO. **ARIZONA.**

: Lonsdale Bldg., Duluth, Minn. Mine office: Globe, Gila Co., Ariz. circa 30 men. W. A. Eaton, president; H. B. Fryberger, vice-presi- L. Palmer, secretary and treasurer; preceding officers are present but four additional directors are to be named, 1909; C. W. Pritchett, anager and consulting engineer; Thos. W. Hamilton, superintendent. October, 1908, under laws of Minnesota, with capitalization $500,000, par. Company sold 480,000 shares at 60 cents, for cash, giving a net of $288,000, available for development, 20,000 shares going to owners

s, 33 claims, area circa 600 acres, in 2 groups, held under bonds and gregating $415,000, of which $20,000 was paid on organization, leaving due on bonds, in easy installments, over a 7-year period, expiring 1916. is 4 miles west of the Miami, on Pinto Creek, which runs through the part of the lands, and is circa 14 miles from Globe, with a fairly good ad between. The Miami is to have railway connections shortly.

property shows a formation markedly similar to that of the Miami, even better surface showing of iron stains. The lands carry an area altered schist, surrounded by areas of intrusive and extrusive igneous nilar to the holdings of the Miami and Inspiration mines, 4 miles east, schistose areas of the Cactus and Miami district undoubtedly were us, at some ancient period, but were divided by intrusions of igneous d subsequent erosion. The schist is very old, and extensively meta- d, and apparently was of sedimentary origin. The schist is fractured mpled, this affording a basis of subsequent mineralization through innumerable cracks and crevices, there being an enormous area of brecciated schist, well suited for the circulation of mineral-bearing and deposition of ores. The management hopes to develop a large cupriferous altered schist, similar to that of the Miami. Payable ere found in the Miami at depth of circa 230′, and apparently should d at depth of 200′ to 300′ in the Cactus.

workings, by former owners, consist of a number of short tunnels and wo-compartment shaft, sunk at the southern end of the property. The t has been abandoned, as it was sunk on a fault-plane showing copper but not likely to prove workable, as the fault was of a comparatively iod, hence the old workings are of no present value. Present develop- by a 2-compartment shaft, started Nov. 30, 1908, which is for explora- rposes only, as the location of permanent shafts will depend upon de- nts at depth.

uipment includes a 60-h. p. boiler and a small hoist. Buildings include y, boarding-house and tent-houses for workmen.

. Pritchett estimates that about 2 years will be required to develop a ine, if ore is found as expected, and that about $1,000,000 will be re- to build a large modern concentrator, with another year or 18 months for equipment and beginning of production on a large scale. The prop- s an excellent management, and is of unusual promise, differing from w mining promotions in that it is practically certain to make either large mine or no mine at all, with chances favoring the making of a ine.

S MINE. **UTAH.**

ed by Newhouse Mines & Smelters.

S SMELTING & COPPER CO. **UTAH.**

d. Absorbed by Royal Copper Mining Co., now Newhouse Mines & . Formerly at Newhouse, Beaver Co., Utah.

CADENA DE COBRE MINING CO. MEXI

Office: Secretary, Bisbee, Ariz. Emil Marks, president; H. L. Fen vice-president; M. Newman, treasurer; R. C. Stanford, secretary; preced officers, John W. Gillingham, John Falls, John Pennypacker, H. W. Aiken C. A. McDonald, directors. Organized Dec. 24, 1904. Lands, circa 250 p tenencias, in the Sahuaripa district of Sonora, Mexico, developed by 3 t nels, said to show good ore. Company paid for lands, but former officers s to have vested titles in their own names. Ernest E. Hughes, former pr dent, was deposed early in 1906, and present management sued former offic to cancel the issue of 550,000 shares of stock, which said officers voted th selves as a gratuity. According to statement of new management, the officers simply stole the 550,000 shares. The case seems a parellel to that the South Bisbee.

CADIA COPPER MINING & SMELTING SYNDICATE. AUSTRALI

Mine and works office: Cadia, N. S. W., Australia. Mine, in the Ora district, has shown payable ore from surface, ranging from 5 to 13% copper tenor. Has a smelter, built 1906-1907, with 4 reverberatory furnac and employs about 150 men, Production, 1906, was 1,043,840 lbs. fine copp Property considered valuable.

CADIA EXTENDED MINE. AUSTRALI

Office: Newcastle, N. S. W., Australia. Mine office: Cadia, N. S. W Australia. Property, on Waterfall Creek, about 1½ miles from Cadia, know formerly as the Little Canoblas, shows a tremendous blowout, and a remar ably wide gossan of low grade iron ore. A number of shallow shafts sh native copper, carbonate and sulphide ores and tetrahedrite. Formerly cons erable cupriferous iron ore was taken from this mine for fluxing the ores the Cadia property. Property considered promising.

SOCIEDAD ANONIMA MINAS DE CALA. SPA

Office: Bilbao, Spain. Mine office: Cala, Santa Olalla, Huelva, Spa Conde de Rodas, president; Don Emilio Vallejo, secretary. Organized A 31, 1900, under laws of Spain, with capitalization 15,000,000 pesetas. Pr erty is a group of 8 mines, area 346 hectares, at Cala, carrying magnetic i ore and cupriferous pyrites, ore bodies apparently being extensive. Comp is supposed to have built a 97-kilometer railroad, from the mines to San J del Aznalfarache, on the Guadalquivir River, in the adjoining province Sevilla. Presumably idle.

CALABASAS COPPER CO., LTD. ARIZO

Dead. A swindle, perpetrated by Douglas, Lacey & Co., 66 Broadw New York, N. Y. For methods of this firm see article on Amalgamated G & Copper Co. Formerly at Patagonia, Santa Cru Co., Ariz.

COMPAÑIA DE MINAS i FUNDICION DE CALAMA. CHI

Office: Valparaiso, Chile. Mine office: San José del Abra, Calama, An fagasta, Chile. Works office: Calama, Antofagasta, Chile. Organized A 16, 1903, under laws of Chile, with capitalization 600,000 pesos, shares pesos par, and reorganized, Apr. 31, 1903, under laws of Chile, with capit ization £250,000, shares £1 par. Lands, in the desert, 2 kilometers east Calama, produce ores of 10 to 13% in copper tenor. Has a hydro-elect power installation, with 260-h. p. turbine, direct-connected with a 250-k. dynamo, taking water from the Rio Loa, 1 mile distant. Has a small c centrator with 1 crusher and 3 jigs. Smelter, known as Los Chorillos, ha reverberatory calciners and a 5′ cylindrical blast-furnace, also a furnace calcining limestone used for making briquettes, and turns out ejes of 46.3 average copper tenor. In 1903 one ton of coke was required for smelting tons of charge, slags averaging 0.5% copper. Wages at smelter are high,

pesos per day. Production, 1903, was 1,717,035 lbs. fine copper, and ve been much larger for 1907. Is an important property with a nanagement.

AS MINING ASSOCIATION. **NEW MEXICO.**

office: Alamagordo, Otero Co., N. M. E. A. Hersperder, superin- t last accounts. Lands include the Black Burro mine, showing sul- s of copper and lead. Perhaps succeeded by Calaveras Mining Co.

RAS MINING CO. **NEW MEXICO.**

r returned unclaimed from former office, Pittsburg, Pa. Mine office: tero Co., N. M. Property is the Garnet mine, held under lease. ft, 400', shows sulphide ore, with gold and silver values. Has shipped l ore netting $900 to $1,500 per car.

TE MINES. **ITALY.**

office: Traves, Torino, Italy. Property, in the western Alps of , formerly was a considerable producer of nickel, cobalt and copper, m chalcopyrite, found in stratified archaic rocks. Idle at last ac-

L CALDERON. **BOLIVIA.**

and mine: Coro Coro, La Paz, Bolivia. Property is the San Angus- worked in a primitive way, which is a small producer of native cop- ed in conglomerate rock.

ELL COPPER CO. **MICHIGAN.**

d. Absorbed December, 1906, by La Salle Copper Co. Was organ- e 11, 1906, under laws of Michigan, with capitalization $2,500,000, 25 par. Lands were 560 acres, south and west of the Tecumseh. For- Calumet, Houghton Co., Mich.

ON COPPER CO. **TRANSVAAL.**

e office: Zoutpansberg, Transvaal. Lands are 96 claims on Farm and No. 1435, adjoining the Messina Extension; 96 claims on Farm No. 1439; 206 claims immediately west and 300 claims immediately M'Tamba, and 204 claims adjoining the Amatola. Apparently only trenching has been done, though company planned, 1907, starting a

ONIA COPPER CO., LTD. **NEW CALEDONIA.**

d. Was promoted by the notorious London & Globe Finance Corpora- d., and was robbed before born. Property sold to Australian Smelting tion, Ltd. Formerly at Noumea, Diahot, New Caledonia. Fully de- Vol. VI.

ONIA GOLD & COPPER MINING CO. **IDAHO.**

e office: Wallace, Shoshone Co., Idaho. Lands supposedly are in the of Stevens Peak.

ONIAN EXPLORATION CO. **MEXICO.**

d. Formerly at San Nicolás del Oro, Coyuca de Catalán, Guanajuato,

ONIAN MINING CORPORATION, LTD. **NEW CALEDONIA.**

d. Liquidated, voluntarily, December, 1903. Formerly at Noumea, New Caledonia.

NIA MINA DE CALIFORNIA. **MEXICO.**

d. Formerly at Cumuripa, Guaymas, Sonora, Mex.

RNIA-ALASKA MINING & DEVELOPMENT CO. **ALASKA.**

e office: Valdez, Alaska. Capt. Austin E. Lathrop, manager. Lands, Alaska Consolidated Copper Co., in the Copper River district, produced mass of native copper, 1908.

CALIFORNIA-AMECA MINING CO. ME

Mine office: Ameca, Jalisco, Mex. Property is the San Pedro mine, ing copper ore. Presumably idle.

CALIFORNIA-ARIZONA COPPER CO. ARIZ

Mine office: Wellton, Yuma Co., Ariz. F. A. Meyer, superinten Property has tunnels of 100′ and 160′, and was developing, with a small at last accounts.

CALIFORNIA & ARIZONA COPPER MINING CO. ARIZ

Dead. Formerly at Ft. Huachuca, Cochise Co., Ariz. Described Vol.

CALIFORNIA & ARIZONA DEVELOPMENT CO. ARIZ

Dead. Formerly at Ft. Huachuca, Cochise Co., Ariz. Described Vol

CALIFORNIA & ARIZONA GOLD & COPPER CO. ARIZ

Office: 622 Citizens National Bank Bldg., Los Angeles, Cal. Jos. C man, president; Selwin J. Michelson, vice-president; Jos. Wilkinson, secr and treasurer.

CALIFORNIA COPPER CO. CALIFOR

Dead. Succeeded, August, 1906, by California-Nevada Copper Co. merly at Daulton, Madera Co., Cal.

CALIFORNIA COPPER KING CO. CALIFOR

Dead. Formerly in Riverside County, California. Described Vol. III

CALIFORNIA-CORONA MINING & MILLING CO. CALIFOR

Office: care of W. S. Zehring, secretary, Salt Lake City, Utah. Mine o Manvel, San Bernardino Co., Cal. W. J. Craig, president; J. W. Currie, president; E. O. Howard, treasurer; preceding officers, Harrison O. Shepard W. Smith and Andrew T. Stahl, directors; Alex Colbath, Jr., superintend Organized December, 1906, under laws of Utah, with capitalization $600, shares $2 par. Lands, 16 claims, 8 patented, circa 5 miles north of Ma and about 7 miles from the Salt Lake railroad, showing auriferous and gentiferous copper and lead sulphides with quartz gangue, well suited to centration. Mine is said to have considerable ore of good grade blocked for stoping.

CALIFORNIA GOLD & COPPER CO. CALIFOR

Mine office: Spenceville, Nevada Co., Cal. C. C. Bitner, president; Noehler, general manager. Has auriferous and argentiferous copper ores, water and electric power, and shipped, 1907, a little high grade ore to Sh County smelters. Possibly succeeded by Mineral Hill Mining & Smelting C

CALIFORNIA GOLD & COPPER CO. CALIFOR

Office: 354 South Hill St., Los Angeles, Cal. Mine office: Vontrig San Bernardino Co., Cal. A. H. Cram, president and general manager; C. Page, vice-president; H. C. Hibbard, secretary. Organized, 1904, with talization $500,000.

Lands, 9 claims, 2 miles from Vontrigger, including the Vontrigger having contact deposits between granite, quartzite and limestone, with di dykes. Property is said to carry 8 clearly defined parallel veins of slig auriferous copper ore in 2 ore zones of 200′ to 300′ width. Below the oxi zone of circa 80′ depth ore is reported to range 9 to 15% in copper with fair gold and silver values. Development is by shafts of 100′, 150′ 317′, and a 350′ tunnel, with about 4,000′ of workings, deepest shaft bottomed in ore giving average assays of about 20% copper, with gold v up to $3 per ton.

Mine has gasoline power, and pipes water 6½ miles from Hackl Springs to a 40x50x7′ reservoir. Has circa 15,000 tons of ore on the secured from development work, and has shipped carload lots of ore re ing 8.7 to 10.9% copper, with small gold and silver values. Is experime

electrolytic reduction plant, and is said to plan a 200-ton concentrator. considered promising.

RNIA IMPROVEMENT CO. **CALIFORNIA.**

e: 101 Sansome St., San Francisco, Cal. Mine office: Mills College, Co., Cal. F. M. Smith, president and general manager. Property is a Heights mine, in the outskirts of Oakland, producing cupriferous arrying 1 to 2% copper and about 45% sulphur. Production, 1905, 3 tons of pyrite, valued at $18,958.57, shipped crude to acid-makers.

RNIA & MASSACHUSETTS COPPER MINING CO. **CALIFORNIA.**

e office: Red Bluff, Tehama Co., Cal. N. E. Guyot, manager; Eugene foreman. Lands, circa 40 claims, unpatented, west of Red Bluff, in 25, Township 27 North, Range 9 West, known as Tom Head mine, ave been bored by diamond drill. Property shows a 24′ vein carrying opper, bornite and chalcopyrite, and considerable ore of medium and de has been blocked out. Equipment includes a hoist, 2 air-compressors awmill. Plans were prepared tentatively, 1907, for a 300-ton smelter, electric power. Idle at last accounts.

ORNIA MINING CO. **UTAH.**

d. Formerly at Park City, Summit Co., Utah. Described Vol. VI.

ORNIA MOUNTAIN MINING CO. **COLORADO.**

e office: Eureka, San Juan Co., Colo. A. H. Kunkle, superintendent. riferous and argentiferous ores of lead, copper and zinc, with electric

ORNIAN COPPER SYNDICATE, LTD. **CALIFORNIA.**

d. Succeeded, April, 1902, by Fresno Copper Co., Ltd. Formerly at Fresno Co., Cal.

ORNIA-NEVADA COPPER CO. **CALIFORNIA.**

ice: 1801-43 Exchange Place, New York, N. Y. Mine office: Daulton, Co., Cal. F. L. Underwood, president; E. B. Van Norden, treasurer; Mitchell, clerk; W. C. Brace, manager. Organized Aug. 11, 1906, under Maine, with capitalization $2,500,000, shares $5 par; issued, $1,375,000. thorized a bond issue of $2,500,000, at 7%, convertible into stock within . Controls, through stock ownership, the Bristol Consolidated Mines & g Co., and owns the Ne Plus Ultra mine, near Daulton, formerly held California Copper Co., having refractory ores that have proven difficult omical reduction. The Ne Plus Ultra has a 100-ton smelter, which is uccess. Company also owns the Aetna gold mine, near the Treadwell laska, said to show a vein of 50′ to 100′ width, traceable 3 miles, carry- average of $3.50 gold per ton.

ORNIA-NEVADA MINING & MILLING CO. **CALIFORNIA.**

ice: care of E. S. Collett, secretary, Denver, Colo. Mine office: Bishop, o., Cal. B. Gregory, president; J. E. Reinhart, treasurer; Albert E. , superintendent. Organized Dec. 7, 1906, under laws of Arizona, with zation $1,500,000, shares $1 par. Lands, 10 claims, at the head of ʼaño, 5 miles north of Cedar Flat and circa 16 miles southeast of Bishop, ed by a number of 10′ pits and tunnels, said to show well-defined veins g auriferous and argentiferous copper and lead ores.

DA CALINNHA. **PORTUGAL.**

ce: care of M. Paul Chapuy, manager, Santa Appolonia, Lisbon, Portugal. dly owned by a French company. Property is in Portugal, presumably in e of Alemtejo. Is a small exporter of cupriferous iron pyrites to L.

NGTON COPPER MINING CO. **AUSTRALIA.**

e office: Callington, South Australia. Mine is opened to depth of

600′ and length of 700′, on a vein circa 16′ wide. Company asks an a of £1,000 from the government, for the reopening of the mine, which ha idle since 1875.

CALSTOCK TIN & COPPER, LTD. ENG

Offices: 16 Place Vendome, Paris, France, and 30 Moorgate St., L E. C., England. Mine office: Calstock, Cornwall, England. Geo. Ro chairman; G. Gilnicki, mine manager; John A. Russell, secretary. Org May 5, 1900, under laws of Great Britain, with capitalization £60,000, £1 par; issued, £63,988. Debentures, £14,120, at 5%. Property is the of Wales tin mine, and sundry mineral licenses on adjoining property a 56-stamp mill. Idle.

CALUMET & ALGOMA DEVELOPMENT CO. ONT

Dead. Succeeded, 1903, by Hermina Mining Co., Ltd. Formerly a sey, Algoma, Ont.

CALUMET & ALGOMA MINING CO. ONT

Office: 109 Fifth St., Calumet, Mich. Mine office: Massey Stati goma, Ont. Joseph Hermann, chairman; Lucas Hermann, secretary. ized, circa 1905, with capitalization $1,000,000, shares $1 par, as succes Copper Queen Mining Co., Ltd. Lands, 1,166 acres, showing a 45′ fissur traceable circa 3 miles, carrying medium grade chalcopyrite, more or less erous, with occasional bornite and malachite, and giving assays of 5 t copper. Has 2 shafts, No. 1 being 138′ deep, and 2 tunnels, longest 195′. are heavily timbered and well watered. Is in bad shape financially. Id eral years and practically moribund.

CALUMET & ARIZONA MINING CO. ARI

Office: Calumet, Mich. Mine office: Bisbee, Cochise Co., Ariz. office: Douglas, Cochise Co., Ariz. Chas. Briggs, president; Capt. Jas. son, vice-president; Capt. Thos. Hoatson, second vice-president; Louis W ell, third vice-president and general manager; Gordon R. Campbell, secr Peter Ruppe, treasurer; preceding officers, Thos. F. Cole, Geo. E. Tener, ter A. Congdon and Chas. d'Autremont, Jr., directors; Jas. Wood, smelt perintendent; Henry B. Paull, auditor; W. E. McKee, master mechanic; Whitley, engineer; J. N. Kinsey, smelter clerk; John Collins, mine for A. J. McDermott, smelter foreman.

Organized March, 1901, under laws of Arizona, with capitali $2,500,000, shares $10 par; issued, $2,000,000. Annual meeting, second Mon April. Merchants & Miners Bank, Calumet, Mich., registrar. Shares are on the Boston stock exchange. Has paid dividends as follows: $6.50 pe in 1904; $8.50 in 1905; $13 in 1906, and $16.50 in 1907. Dividends for quarters of 1908 were $1 each, giving total dividend payments, to S 1908, of $7,500,000. Ended 1907 with quick assets of $3,383,732, inc $1,297,387.31 in demand loans and bills and accounts receivable; $1,240 in cash and copper on hand at 12½ cents per pound, and $105,250 shares in other companies. Total liabilities were $277,908.52. Company holds and options on various properties aggregating $900,000, and during 19 pended $315,445.55 for development work on properties under option, and payments on options of $58,911.97, a total of $374,357.52.

Lands include the original mining claims at Bisbee, the Mammoth bought 1907, and the 640-acre smelter-site at Douglas, with various groups of Arizona claims, held under bond and lease.

The Calumet & Arizona mine proper includes 12 claims, patented, ar acres, adjoining the Copper Queen, side-line agreements with the Queen insuring freedom from possible litigation, and continuance of th ent exceedingly neighborly relations. The mine is opened in limestone

a porphyry contact, with occasional porphyritic intrusions. The surface gives small indications of values, showing but small and infrequent outcrops, the existence of the Irish Mag ore bodies having been inferred from underground work in the adjoining shafts of the Copper Queen, after careful study of the general geological conditions of the district. Ore occurs in highly irregular bodies, the mine showing native copper, cuprite, melaconite, malachite, azurite, chalcocite and chalcopyrite, usually with a talcose gangue, and with considerable hematite and manganese ores, the latter carrying malachite in small disseminated nodules, and frequently averaging 10 to 18% in copper. The ore, which is practically self-fluxing, averages about 2 oz. silver and 0.05 oz. gold per ton, as smelted. The ore bodies are extensively developed, but are not largely blocked out, owing to the constant shifting of the ground, caused by the creeping of the mountain above, as is the case at the neighboring Copper Queen mine, requiring very heavy timbering, with frequent bulkheading, and constant care for all openings, which renders it prudent to keep costs down by blocking out ore but a comparatively short time ahead of actual stoping requirements. Timber is secured from a great distance, and to guard against emergencies large stocks are carried. The mine as a whole is not especially wet. A mine fire, 1907, caused some trouble, but was overcome speedily. New openings, 1907, were 23,016'.

The Irish Mag shaft, sunk on a single 20-acre claim, was the original mine of the Calumet & Arizona. This property has a well-timbered 4-compartment vertical shaft of 1,298' depth, sunk in hard limestone throughout, except where occasional ore bodies were cut, rendering the shaft safe from drawing. Levels are opened at 100' intervals, from 750' to 1,250' inclusive, the upper levels showing exceedingly rich ore, there being entire stopes assaying up to nearly or quite 40% in copper. In 1907 four new bodies of high grade ore were opened on the 1,150' and 1,250' levels. The Mag shaft has an auxiliary double hoist on the 1,050' level. The shaft has a 78' steel gallows frame and a 114' ore-bin, with a 20x60" direct-acting Nordberg hoist, capable of raising a 3-deck cage at the rate of 2,000' per minute from a depth of 1,600'. This hoist has raised, for some years, about 600 tons of ore daily, from an average depth of 1,000', besides caring for men, timber and tools, and the Irish Mag shaft was operated continuously, for 5 years, without the loss of a day's time, probably establishing a world's record.

The 4-compartment Oliver shaft, 1,150' deep, is bottomed on the same level as the Irish Mag, the collar of the Oliver being 150' lower than the Mag and 50' higher than the collar of the Lowell shaft of the Copper Queen. The Oliver shaft, developing both of the Senator claims, shows large bodies of high grade ore, having first cut ore at 710', or about 300' higher than ore was found in the Lowell shaft. The lower workings show rich sulphides, with high grade oxidized ores above, there being large stopes of high grade oxidized ores in the upper levels, practically untouched, except for opening work. The Oliver shaft has a 600-gallon Nordberg electric pump, which is giving good service, and on the surface is a powerful Nordberg hoist.

The Buckeye claim has been explored, and slightly developed, by crosscuts from the Oliver shaft, and from the Cole shaft of the Superior & Pittsburg, there being a good body of sulphide ore opened on the 1,050' and 1,150' levels.

The Pride claim has a promising ore body, opened by a drift from the 1,250' level of the Irish Mag shaft.

The Gibraltar claim, which is the southernmost, wedges into the holdings of the Superior & Pittsburg. The Gibraltar has several exploring shafts and trenches, showing iron and a little low grade copper ore of promising appearance, though below commercial tenor.

The Wagner and Hope claims, lying circa 2,000′ southwest of the Iri Mag shaft, adjoin the Pittsburg & Duluth mine of the Superior & Pittsbur and have been explored by a crosscut from the Mag that traversed 600′ Copper Queen ground, stopping about half way across the Wagner and Hop group, showing nothing of especial promise.

The Washington, Angel and Old Republic claims lie on the porphyry sid of the gulch, and were secured mainly as a possible smelter-site, then bein considered of little promise for mineral, but, in view of developments in th Junction and Calumet & Pittsburg mines of the Superior & Pittsburg, thes claims are of possible mineral value.

The surface equipment and machinery plant at the mine is very com plete. The original plant was clustered about the Irish Mag shaft, on a steep hillside, where limited room was secured by grading, but later equipment in cludes extensive buildings at the Oliver shaft and elsewhere. The boiler plant at the Oliver has five 280-h. p. marine boilers, burning crude petroleum. The principal compressor plant at the Oliver has a 35-drill Sullivan-Corliss cross-compound 2-stage air-compressor, with 17x34″ steam cylinder and 20x34″ air cylinder, having a piston displacement of 6,600 cubic feet of free air per minute. There also are 3 class WB2 Sullivan straight-line air-compressors. Much of the ore is so soft that it can be bored with a breast-auger, thus reducing requirements in the way of air for power drills. Electricity is used extensively on surface, and also for pumping. The electric power plant at the Oliver shaft has 300-kw. and 500-kw. Westinghouse-Parsons 2,200-volt, 60-cycle, 3-phase turbo-generators, two 220-kw., 2,200-volt, 60-cycle, 3-phase motors, direct-connected with the steam turbine, a 300-kw. General Electric rotary converter transforming a 2,200-volt alternating current to a 550-volt direct current, for operating the street-car line to Warren, four 40-h. p. Buffalo vertical engines direct-connected to four 25-kw., 115-volt Crocker-Wheeler generators for electric light and power for ventilating fans, and various minor electrical machinery. An automatic telephone system, having 25 stations underground and on the surface, is connected with the smelter at Douglas.

The new steel-frame machine shop is divided into two 60x48′ parts, for the machine shop and smithy. Adjoining is a plate shop, 40x128′, of steel frame, with corrugated iron roof and siding. There is a framing mill at the Mag shaft, also a warehouse and office building. A 60x125′ administration building is planned to be erected at Warren, the townsite adjacent to the Calumet & Arizona and Superior & Pittsburg mines. A hospital with an efficient staff is maintained for employes, and a model changing house has hot and cold running water, tub and shower baths and lockers for 500 men. Fire protection is furnished by direct pipe-lines to large storage tanks, giving an effective pressure of 100 pounds, with hose-houses and hose-carts at each shaft, all hose-couplings being made to connect with those of the Bisbee fire department.

The Mammoth group of 35 claims, also known as the Scanlon or Clark Scanlon property, in the Copper Creek district, 16 miles northeast of Mammoth, Pinal Co., Ariz., was bought September, 1908, when the final payment of $125,000 was made thereon. The Mammoth property has been bored extensively by diamond drills, giving good cores, and has a 2-compartment working shaft, with several levels opened, the workings blocking out considerable high grade sulphide ore. It is said that the company plans a 15-mile railroad from Copper Creek to the Mammoth mine.

The Costello-Casey group, 5 claims, sometimes known as the Collins group near the Leadville mine, at Pearce, Cochise county, is held under bond, time of final payment having been extended to March 30, 1909. Two shafts a

sinking, showing considerable good carbonate and sulphide ore, and prospects are promising. Bond on the Leadville property at Pearce was forfeited circa 1907.

The smelter is at Douglas, 25 miles from the mine, receiving ore over the El Paso & Southwestern railway, at a very favorable freight rate. The first stack was blown in Nov. 15, 1902, but in 1907-1908 the works were so thoroughly enlarged and overhauled as to amount to a practical rebuilding, the old equipment having 1,500 tons daily capacity, while the new equipment, when completed, will give 3,500 tons, daily capacity, providing for the smelting of Superior & Pittsburg ores, as well as the reduction of ores of the Calumet & Arizona.

Ore is received at the works in new steel ore-bins circa 200′ in length, with 2 rows of 180 chutes, bins being surmounted by a railway track. The entire plant is served by a standard-gauge railway line, having tracks to each furnace and to every department of the works.

The blast-furnace building, of steel frame, is 50x208′ in size, having a steel dust-chamber, and steel smokestack 200′ high and 16′ in diameter. The old equipment consisted of five 300-ton furnaces, and a sixth furnace, of 500 tons daily capacity, was blown in circa September, 1908. The 5 old furnaces are to be overhauled and lengthened, making each of 500 tons daily capacity, and a seventh 500-ton blast-furnace is to be installed, giving the works a nominal capacity of 3,500 tons daily, though in practice it is likely that one furnace will be held as a spare, giving an actual working capacity of 3,000 tons daily. The management is considering the building of a reverberatory furnace, for treatment of flue dust and slags.

The converter building, widened 15′ in 1905 and lengthened 30′ in 1907, has 4 stands which have been moved to the opposite side of the building in order to give room for 2 additional furnaces. Matte is discharged into tilting pots, and taken thence by 3 electric traveling cranes to the converters, which turn out blister copper of 99.2% tenor, carrying small gold and silver values, which is shipped to the Nichols Copper Co., New York, for refining. A new dust-chamber has been built for the converter flue. The lining plant of the converter department has a silica mill operated by a 180-h. p. motor, and the briquetting plant is operated by a 100-h. p. motor.

The old power-house, 80x160′ in size, was increased, 1907, by the building of a transverse section 100x100′ in size, the new building being divided through the center by a row of columns into 2 bays, each 55′ wide, and each served by a 10-ton hand-power traveling crane. The machinery equipment of the power plant has been greatly enlarged, and includes a 500-kw., 440-volt, 60-cycle, 3-phase Allis-Chalmers-Parsons turbo-generator, a 160-kw. synchronous motor generator set, which can be run to furnish electric energy at various voltages, and with either an alternating or direct current; an 850-h. p. Nordberg steam engine; a 400-h. p. engine running 2 Nordberg air-compressors, with cross-compound steam ends having 22″ and 42″ cylinders and 48″ stroke, and air cylinders of 48x48″, giving a 12-pound blast pressure; 2 Murray-Corliss tandem-compound engines with 14″ and 28″ cylinders and 36″ stroke, direct-connected to 2 Connersville No. 10 blowers; a pump of 5,000 gallons per minute capacity; 2 Prescott compound vertical-beam condensers, having steam cylinders of 14″ and 25″, with 24″ stroke; two 36x24″ vacuum pumps; a direct-acting Prescott pump for circulating water; a Prescott compound duplex 500-gallon mine pump for furnishing hydraulic power for converter stands, and various minor engines, the power-house having machinery with an aggregate of 3,750 h. p.

The boiler-house at the power plant formerly had five 250-h. p. boilers and two 280-h. p. boilers, which were added to, 1907, to furnish power for the new

plant. Fuel is petroleum, there being four 45,000-gallon oil tanks for sto Water in ample supply is secured from flowing artesian wells, of 450′ ave depth.

Miscellaneous buildings at the works include a new steel-frame mac shop and steel-frame smithy. There are two 16-room lodging houses, a considerable number of dwellings for employes.

Average forces, 1907, were 1,028 men, of whom 621 were employed a mine and 407 at the smelter. Some trouble was had, 1907, with labor un but this came to an end by the refusal of the company to submit to the tation of a miner's union, organized against the wishes of a majority of mine workers of Bisbee, as proven by a referendum vote, on the Austr plan, in which the proposition to organize was voted down by a majorit 4 to 1, before organization was effected, the Western Federation of M refusing to be bound by the vote that it had itself invoked.

Production, 1906, was 36,934,387 lbs. fine copper, 194,451 oz. silver 4,241 oz. gold, ore yielding 7.91% actual copper extraction. For 1907 duction was 30,689,448 lbs. fine copper, with combined gold and silver v of $210,846.12, an average of $13.74 in precious metals per ton of fine co secured from 260,815 wet tons of ore, making 232,460 dry tons of ore, g an average extraction of 6.56% per dry ton, or 5.85% per wet ton, the dec from nearly 8% extraction in 1906 being caused, not by decreased ore va but by the treatment of lower grade ores, owing to the high price of co Costs, 1906, were 5.71 cents per pound of fine copper, including construc rendering this one of the lowest cost copper mines of the world; but for owing to a combination of fortuitous circumstances, costs, exclusive of struction, were about 10.5 cents per pound of copper. The latter figure, ever, is much above normal, and cannot be taken as a criterion. The Cal & Arizona is one of the best among the world's big copper mines, and h management that is most excellent, from the president of the company d to the heads of departments.

CALUMET & BISBEE DEVELOPMENT CO. ARIZO

Office: Calumet, Mich. Mine office: Bisbee, Cochise Co., Ariz. F S. Carlton, president; Wm. R. Oates, secretary. Organized Oct. 20, 1902, u laws of Arizona, with capitalization $400,000, shares $10 par; 15,000 sh issued and fully paid. Lands, 4 claims, at Don Luis, adjoining the Lake perior & Pittsburg. Has a 960′ main shaft. Idle for several years, owin lack of funds. Fully described Vol. IV.

CALUMET & BOSTON COPPER CO. ARIZO

Office: care of J. C Stout, secretary and treasurer, St. Paul, Minn. office: Bisbee, Cochise Co., Ariz. C. W. Ruth, vice-president and man Organized October, 1906, with capitalization $500,000, shares $10 par. L 10 claims, area circa 150 acres, on the porphyry side of Tombstone Ca having a 400′ tunnel on the Bessemer claim showing ore assaying 2 to copper, also quartz assaying up to $25 gold per ton.

CALUMET & BUTTE DEVELOPMENT CO. MONTA

Dead. Reorganized, 1907, as Calumet & Butte Mining Co. Formerl Butte, Silver Bow Co., Mont.

CALUMET & BUTTE MINING CO. MONTA

Dead. Organized, 1907, under laws of New York, with capitaliz $1,500,000, shares $1 par, as successor of Calumet & Butte Development Reorganized circa August, 1908, as Western Copper Co. Formerly at B Silver Bow Co., Mont.

CALUMET-CLIFTON COPPER CO. ARIZO

Letter returned unclaimed from former office and mine, Clifton, Gra

and treasurer; Walter Fitch, general superintendent; Will A. Childs intendent; W. M. Gibson, assistant superintendent; Fred S. Eaton, chie E. S. Grierson, chief engineer; E. D. Leavitt, consulting mechanical e John Knox, chief mining captain; Henry Fisher, acting mill superint Jas. B. Cooper, smelter superintendent at Lake Linden; Morris B. smelter superintendent at Buffalo; Hon. Chas. Smith, chief mill and clerk at Lake Linden works; Geo. M. Kendall, chief smelter clerk at works; Franklin E. Bay, land agent.

Organized 1871, under laws of Michigan, with capitalization $2, shares $25 par; $12 paid in, and $1,058.50 per share in dividends paid end of 1907. Charter renewed, 1900, for 30 years, and amended, 190 new laws of Michigan, making the corporation a securities holding com well as a mining and smelting company. Is a consolidation of the Calumet, Portland and Scott mining companies. Fiscal year ends A Annual meeting, third Wednesday in August. Stock is listed on the Stock Exchange, and traded in on the unlisted department of the Ne Stock Exchange. Controls various subsidiary corporations, including 3 ized 1905, known as the Frontenac Copper Co., Gratiot Mining Co. and Mining Co.

Dividends, to Dec. 31, 1907, were $105,850,000, being the largest profits ever divided by any incorporated mining company. Dividen $5,000,000 in 1905; $7,000,000 in 1906, and $6,500,000 in 1907. Two fir terly dividends of 1908 were $5 each. Ended fiscal year, Apr. 30, 190 quick assets of $6,295,717 and liabilities of $1,594,754, giving a sur $4,700,964. Net earnings, for fiscal year ending Apr. 30, 1907, were $11,

Since the change in charter, 1905, permitting the company to acqu hold stock in other corporations, the Calumet & Hecla has secured co various other mines and mineral tracts, either by organizing subsidia porations, acquiring stock in companies previously independent, pur lands outright, or taking options on mining properties of promise.

There are 3 directly subsidiary corporations, these being the Fr Copper Co., Gratiot Mining Co., and Manitou Mining Co. The Cal Hecla controls the entire stock issue of the Frontenac, 18,000 shares o tou out of 20,000 shares issued, and 50,100 shares of Gratiot, out of shares issued.

There are various corporations controlled by the Calumet & Hecla ownership of majority share interests. These include the Centennial Mining Co., in which the Calumet & Hecla owns 46,080 shares out o shares issued from the capitalization of 100,000 shares; La Salle Cop with ownership of 160,050 shares out of 302,977 shares issued; Superi per Co., with 50,100 shares owned out of 100,000 shares issued; Dana Co., with 35,450 shares owned out of 40,000 shares issued, and St. Lo per Co., with 36,400 shares owned out of 40,000 shares issued. The & Hecla also controls the Allouez Mining Co., through the owne 42,978 shares out of 100,000 shares issued, this being not quite a maj terest. A large minority share interest is owned in the Osceola Cons Mining Co. The Calumet & Hecla also holds 1,900 shares of stock Laurium Mining Co., and 891 shares of stock of the Seneca Mining C various corporations named are described under their respective titl

The attempt of the Calumet & Hecla to secure control of the Consolidated Mining Co., at the annual meeting in March, 1907, was determined opposition from the Osceola management, which took t into the Michigan legislature and into the Federal courts. By re litigation, the Calumet & Hecla was unable to gain control of the

at the annual meetings, 1907 or 1908, but in October, 1908, Judge Knappen decided in favor of the Calumet & Hecla, and while there will be further legal opposition, it seems probable that the Calumet & Hecla will succeed shortly in securing control of the Osceola.

The landed holdings of the Calumet & Hecla, including property owned outright, property controlled through subsidiary corporations, mining lands under option and miscellaneous lands, in Houghton, Keweenaw and Ontonagon counties, Michigan, amounted, 1907, to 74,841 acres, or 117 square miles. In addition to its corporate interests, direct options have been taken on the White Pine, Nonesuch and other old mines in Ontonagon county, on which more or less exploratory work has been done. An option on the Clark mine expired circa August, 1907.

The Calumet & Hecla mine proper, area circa 2,750 acres, lies in a compact tract in Sections 11, 13, 14, 15, 22, 23 and 24, Town 56 North, Range 33 West, in addition to which the company owns considerable tracts, west of the Tamarack mine, carrying the underlay of the Calumet conglomerate at such stupendous depths that its opening would require a 2-mile vertical shaft, and it is problematical whether these lands ever will become available for mining on the Calumet conglomerate. The lands west of the Tamarack were explored 1904, by diamond drill, in search of a supposed cupriferous conglomerate, but nothing of importance was found.

The mine was opened originally on the Calumet conglomerate, and a parallel mine has been developed on the Osceola amygdaloid bed, while a third parallel mine is in process of development on the Kearsarge amygdaloid.

The Calumet conglomerate has proven unprofitable both to the north and south of the Calumet & Hecla, though workable at the Tamarack mine, which has developed the underlay by vertical shafts. The conglomerate has an average strike of N. 39° E., with average dip of 37° 30′ with the horizon. The bed is of 8′ minimum and 40′ maximum width, with average width of 12′ to 14′, giving circa 2,400 fathoms of stoping ground per acre, equal to about 43,200 tons of stamp-rock. As a rule, the richer portions of the conglomerate are in the central part of the Calumet & Hecla tract. The walls of the conglomerate carry considerable copper, especially the amygdaloidal footwall, and much of the adhering trap rock formerly rejected is now milled. Pillars of 75′ width, left on either side of every conglomerate shaft, contain stamp-rock equivalent to about 18% of the stoping ground available before the robbing of the pillars. The conglomerate mine is opened 6 to 8 years in advance of immediate requirements, and has about 200 miles of shafts, drifts, crosscuts and winzes. About 30,000,000′ of timber is used in the mine yearly. The life of the old conglomerate mine was said, 1907, by President Agassiz, to be about 15 years, at the present rate of ore extraction, but it is probable that the mine will be producing at least limited quantities of conglomerate rock for 20 and perhaps 25 years to come, though 10 years may see the old mine past its crest, by which time other sources of supply, now developing, should enable the company to maintain production at its regular rate.

The Calumet & Hecla has suffered severely from underground fires. The amygdaloidal trap rock carrying native metal cannot burn, like sulphide ore, but the old timbering eventually becomes nearly as inflammable as so much tinder. The really serious mine fires, 5 in number, occurred in 1884, July and November 1887, Nov. 30, 1888, and May 27, 1900. All possible precautions are taken against mine fires, these including the partial fire-proofing of all mine timber with zinc chloride solution, regular sprinkling of all

shafts, the maintenance of water-pipes and hydrants, fire-hose, che engines, an electric alarm system and 18 telephones at various pump sta from the 8th to the 51st levels, inclusive, in 5 different shafts, so tributed as to be most readily accessible from all parts of the mines. the first 4 fires the Calumet & Hecla suffered aggregate losses of se millions of dollars, while a number of lives were lost, and 3 valuable s were drawn so badly that they were abandoned. The fifth and last in May, 1900, severely tested the mine's fire system, the fire breakin on Sunday evening, when the mine was deserted by all but a few emp and gaining great headway before it was discovered. The burning po of the mine was shut off by closing the fire-doors, and the mine was s at surface, by covering the mouths of the shafts with heavy timbers, with tamped tightly into the crevices between. Wherever gas escaped th holes in the earth, dirt was tamped in and luted with water. The fire extinguished in three weeks, and the South Hecla portion of the mine tinued working without interruption. The 5 serious fires, and sundry ler blazes nipped in their inception, all have been of mysterious origin there seem reasons for suspecting incendiarism. Great precautions taken to prevent unauthorized persons entering the mine, and permissio go underground is given only by the president, in writing, each pass bein a single trip.

The conglomerate property of the Calumet & Hecla is worked as 2 arate mines, known as the Hecla and Calumet branches, the South H being a southerly continuation of the Hecla branch, and the Red Ja vertical shaft is a portion of the Calumet mine. The Calumet to the n the Hecla in the centre and the South Hecla at the south, form a contin mine, developing the Calumet conglomerate by incline shafts, the Red Ja shaft opening the same bed vertically. The conglomerate, opened for 2 along the outcrop, has 11 shafts, 8 being known as single compartment, w means a single hoisting compartment, with 2 shafts having double com ments, and one vertical shaft having 6 compartments. In May, 1908 Calumet & Hecla operated 318 power drills, this being the largest nu in use at any American mine. The 6 shafts have auxiliary electric h in underground stations, with pump actuated by compressed air and electr

Iron pillars are used extensively as supports, in crosscuts connectin Red Jacket shaft with drifts on the bed, and in various incline shaf support the hanging wall. Iron, mainly scrap material, such as wo skip-rails, cut to 10′ lengths and placed above "I" beams, is used for li to some extent. The conglomerate bed in the lower workings is scarc to its average value, being wide but low in copper contents, and it is e from the results secured by the deep shafts in the district, that whi cupriferous stratified beds of Lake Superior may descend to treme distances, copper values grow less at depth.

The conglomerate shafts on the outcrop are as follows, from no south: Nos. 6 and 5 Calumet have 2 compartments each, No. 5 being bot at the 78th level, and it is planned to establish an electric pumping s in this shaft, to drain practically all of the conglomerate workings unwatered by the Red Jacket shaft, in order to increase the ore hoi capacity of the latter. There is a considerable stretch of lean ground No. 6 shaft to the Centennial boundary.

No. 4 Calumet, with 1 compartment, has a vertical depth of 4,748′, an actual depth of 8,100′ on the incline of 37° 30′, with a 190′ winze the bottom, giving a total depth of 8,290′ from the collar of the sha the bottom of the winze.

No. 3 Calumet shaft has been abandoned.

No. 2 Calumet shaft, with one compartment, is 7,000′ deep, practically at the boundary, and it is probable that it will be gutted in the near future.

No. 1 Calumet shaft has been abandoned for some years.

No. 1 Hecla shaft has been abandoned.

No. 2 Hecla shaft, 4,400′ deep, is bottomed at the Tamarack boundary. Stopes are exhausted and the mine is being robbed, lower workings having been gutted up to the 31st level, July, 1908.

No. 3 Hecla, 4,000′ deep, also is bottomed at the Tamarack boundary, and is being gutted.

No. 4 Hecla shaft has been abandoned for some years.

No. 6 Hecla shaft, one compartment, is 6,200′ feet deep, in good ground, and can be sunk to circa 8,500′ depth.

Nos. 7 and 8 Hecla, a double shaft of one compartment each, are 6,300′ deep, in good ground, and can be sunk to about 9,000′ depth.

Nos. 9 and 10 Hecla, 2 compartments, are 6,500′ deep and can be sunk to 8,100′ depth.

No. 11 Hecla, 2,400′ deep, showed very poor ground at the bottom, and gutting was begun several years ago, robbing all pillars from the bottom up. It is probable that this shaft will be abandoned within a comparatively short time.

No. 12 Hecla shaft, at the company's south line, is 6,700′ deep, bottomed in unprofitable ground, and is partly gutted. It is probable that this shaft will be worked out and abandoned circa 1909.

The Red Jacket vertical shaft, permanently bottomed at 4,920′ depth, cuts the lode at 3,287′. Rock temperature was 87° Fahrenheit, reduced to 70° to 90° by connection with No. 4 Calumet shaft, exhaust air from the power-drills aiding in cooling the mine. The Red Jacket was planned to open a mine unconnected with the older shafts, to give reserve stopes in case of fire, but owing to heat and danger, connection was made with the older workings. The Red Jacket shaft is 14′ 6″ by 24′ 6″ within timbers, and is built of brick and cement from collar to the solid rock, and timbered below with Georgia pine. There are 6 compartments, 2 used for hoisting, 2 for water, and 2 for men and supplies. The 2 hoisting compartments, at the eastern end, have cages with 9-ton Kimberly self-dumping skips swung under. The 2 western compartments have double-deck cages for men and material, and the 2 middle compartments have large cylindrical steel bailers, for raising water. It is probable that the bailers will be replaced by an electric pumping plant at No. 5 Calumet shaft, which will permit doubling the present hoisting capacity of 1,800 tons of rock daily, by using 4 compartments for raising ore. Timber for the Red Jacket shaft is lowered through No. 5 Calumet, with which the Red Jacket is connected by a crosscut. The Red Jacket shaft hoists rock from all of the northern shafts below the 56th level, at which point the conglomerate is intersected. The Red Jacket shaft has 9-ton steel storage bins at its various productive levels, which aid in maintaining the uninterrupted hoisting service that is absolutely essential in a shaft of a mile depth. A ventilating chimney at the collar of the shaft does away with ice formerly caused in winter by vapors arising from the shaft. The shaft rockhouse of the Red Jacket is 100x100′ on the ground and 110′ high, with crushers for 2,000 tons of rock daily, and room for doubling the present crushing equipment.

A tract of 200 acres, a quarter-mile wide and 1¼ miles long, lying between the Tamarack and Tamarack Junior mines, carries the underlay of the conglomerate at great depth, and, to obviate sinking a deep and costly

vertical shaft, this tract is being opened by a blind shaft, whi
1,500′ east of the Red Jacket vertical and near the bottom of Cal
4 shaft, which abuts on the Tamarack boundary line at a depth of 8,
blind shaft is being sunk 25′ under the footwall, at the same angle
of the conglomerate, thus assuring solidity of walls while sav
and expensive crosscuts to the bed on each level. A "footwall
the 57th level parallels the regular drift at a distance of 25′ in the
between the Red Jacket vertical shaft and the blind shaft, of
avenue for operation which obviates the confusion certain to result
regular mine drifts given double duty. The blind shaft starts in
wall drift under and parallel with the 57th level, and eventuall
about one mile in depth, opening four of the five 40-acre tracts, le
fifth and last to be opened by a sub-shaft from the blind shaft, wh
less will be sunk on the same system. The necessity for this peculi
of development arises from the fact that the boundary lines of the
run north and south, while the strike of the lode is N. 39° E., givin
of dip of N. 51° W. Owing to the incline shafts being sunk on the
lode while the blind shaft must follow the section lines, the latter
diagonally on the dip of the bed, giving the blind shaft an avera
about 22° only, although the bed dips at 37° 30′. This unusually f
permits the hoisting of rock in tram-cars, which are hauled th
blind-drift and dumped into the steel bins of the Red Jacket shaft
ing, thus saving a transfer at the mouth of the blind shaft. The
in the workings of the blind shaft is satisfactory, the bed averag
14′ width, with circa 10′ fairly mineralized. The abandoned workin
Tamarack Junior mine of the Osceola Consolidated, which adjoins
forties," is drained by holes bored by diamond drill from the bl
obviating possible damage by flooding.

The amygdaloid mine of the Calumet & Hecla is opened on th
amygdaloidal bed, which outcrops 730′ east of the Calumet con
with parallel strike and average dip of about 40°, underlying t
main tract of the Calumet & Hecla mine. There are 6 shaft
amygdaloid mine, Nos. 13 to 18 inclusive, numbered from south
Shafts are duplicates in size, each having 3 compartments, of wh
used for hoisting and 1 for pipes and ladderways. The amygda
has upwards of 20 miles of workings, and has frequent connections
conglomerate by crosscuts. The amygdaloid mine was closed
reopened 1904. In this mine the Osceola bed runs about 35′ in wi
principal values along the foot and hanging, the middle third bein
a rule. Laterals in the Osceola workings are carried as drift-stop
height along the hanging wall. The Calumet & Hecla owns, on its n
about 11,000′ of the strike of the Osceola bed.

No. 13 shaft, the southernmost on the Osceola bed, was open
23d level March, 1908.

No. 14 shaft, 3,200′ north of No. 13, reopened 1905, was at the
March, 1908.

No. 15 shaft, 2,600′ north of No. 14, reopened 1906, was at the
March, 1908.

No. 16 shaft, 1,800′ north of No. 15, resumed work 1905, a
principal productive shaft of the amygdaloid mine.

No. 17 shaft, 1,800′ north of No. 16, was at the 11th level Ma

No. 18 shaft, the northernmost of the amygdaloid mine, started
circa 300′ deep July, 1908, giving a very good showing of stamp-roc

The Kearsarge amygdaloidal bed outcrops about 2,200′ east of th

amygdaloid and 2,900′ east of the Calumet conglomerate, with parallel strike and dip of about 41°, underlying the entire main tract. Work of development was begun August, 1903, and there are 3 shafts, numbered from north to south, each having 3 compartments and being practically duplicates of those on the Osceola amygdaloid. The shafts are "timbered" with steel, brick and concrete, the hanging wall being lined with 3 arches of brick, laid in 3 to 5 courses, thickness being increased with depth, supported by 2 rows of "I" beams which serve also as dividers for the shaft. The Kearsarge lode, as opened by these shafts, is somewhat erratic, though showing considerable stretches of ground that probably will yield 18 to 22 lbs. fine copper per ton, with reasonable selection. The Kearsarge shafts have permanent equipments, with railroad tracks, and are connected with the compressed air mains of the company's system.

No. 19 shaft, about 1,000′ south of the Centennial boundary line, is 1,300′ deep, and has furnished some stamp-rock to the mill, but was closed down October, 1907.

No. 20 shaft, next south of No. 19, is about 1,300′ in depth, and idle also.

No. 21, the southernmost shaft on the Kearsarge bed, is 8,000′ south of No. 20, and, at shallow depth, showed well in copper, but deeper workings are not so rich. Work is in progress.

The Calumet amygdaloid, lying between the conglomerate and the Osceola amygdaloid, has been little opened, but might prove payable, if developed, as it shows some rich ground in a crosscut on the 900′ level.

The shaft rockhouses at the conglomerate incline shafts, of uniform pattern, were remodeled, 1908, to accommodate 40-ton railroad cars. The old 5-ton skips were replaced, 1907, by 7½-ton skips. Rock is hoisted to the top of each shaft-rockhouse, passing thence over grizzlies that allow the finer rock to fall through, the larger masses being reduced in 24x36" crushers, going thence to 18x24" crushers on the floor beneath. Crushed rock falls by gravity into storage bins, whence it is dumped into cars that take it to the mills, railroad tracks running underneath each rockhouse. The standard equipment includes a 20-h. p. induction motor at each shaft for driving crushers.

The surface equipment at the Calumet & Hecla is the most complete found at any mine in the world. With few exceptions everything is duplicated, to prevent possible delays or suspension, by reason of fire or accident.

The power plants at the main mine on the Calumet conglomerate include 4 large boiler plants and 6 hoisting plants. The hoists of the conglomerate mine are very powerful, ranging in capacity from 1,000 to 8,000 h. p. each. Miners are carried to and from work, in the incline shafts, by man-cars, these being long trucks having tiers of circus seats, replacing skips when needed, being shifted quickly on or off the skip-tracks by large cranes. This method has proven the safest, quickest and cheapest for moving men in and out of deep incline shafts.

At No. 4 Calumet shaft there is a group of the most powerful machinery ever built. The brick engine-house, 62x146′, contains the 4,700-h. p. [illegible] engine "Superior," with 40" cylinders and 72" stroke; the auxiliary engines "Baraga" and "Rockland," of 2,000 and 600 h. p. respectively; [illegible] air-compressors, of 25 and 40 drill capacity, and the engine "[illegible]" 7,000-h. p. quadruple-cylinder triple-expansion steel giant, operating [illegible] Nordberg air-compressors with a combined capacity of 650 drills, or [illegible] the requirements of the mine. There also are four 35-drill auxiliary [illegible] In the old Leavitt compressor, water was injected into the [illegible] cylinders, while the Nordberg machines deliver the compressed air [illegible] air to a cylindrical steel cooler, 12′ in diameter and 30′ high, [illegible]

is sprayed from above and drawn off at the bottom, this cooling the air to 80° F. The hoist has 4 drums, each 8′ 6″ wide and 20′ 6″ in diameter, operating 4 different shafts, 2 of these drums carrying nearly 2 miles of steel cable each. Power is supplied by batteries of boilers in 2 boilerhouses adjoining, these having a brick chimney 250′ high, with inside diameter of 12′ 6″. Locomotives haul the coal into the boiler-houses, where it is fed to the grates by automatic stokers.

The Hecla engine-house, of brick, 47x80′, flanked by a large boiler-house, contains the 2,000-h. p. compound hoisting engine Frontenac and 2 auxiliary engines of 600 and 900 h. p., also a 30-drill Rand air-compressor and a pair of water-plunger air-compressors with combined capacity of 144 drills—the largest machines of this type ever constructed.

South of the Hecla plant is the G. H. & S. engine-house, having the Houghton and Seneca engines, of 2,000 h. p. each. The Hecla boiler-house has 5 large boilers and a 200′ smoke stack, of 9′ 6″ internal diameter.

The engine-house operating Hecla shafts 7 and 8 contains the engines Hancock and Pewabic, each of 2,000 h. p., which operate 25′ drums by spur gearing, and a 5,000-h. p. Leavitt engine for man-cars. A 50x120′ boiler-house has 10 boilers and a 250′ smokestack of 12′ 6″ internal diameter.

The South Hecla engine-house at shafts 9 and 10 contains the engines Detroit and Onota, of 1,000 h. p. each.

The South Hecla engine-house at shafts 11 and 12 has two 1,000-h. p. Lidgerwood hoists.

The Red Jacket shaft has an 8,000-h. p. quadruple hoist, housed in a 70x220′ brownstone building, and in an adjoining brownstone building, 70x150′, with a 250′ smokestack of 12′ 6″ inside diameter, are ten 1,000-h. p. boilers. At the rear of the engine-house is a 32x412′ brownstone annex, floored with cement and roofed with slate, in which is carried the fleet-gear. In raising 10-ton loads perpendicularly from a depth of one mile, the weight of the cage and steel cable nearly equals that of the cargo of rock, but with the aid of counterbalance the engines can hoist 10-ton loads at a speed of 40 miles per hour, the regular hoisting time being about 90 seconds for the vertical distance of nearly a mile, this including time taken for starting and stopping, an achievement no locomotive could duplicate on a horizontal plane. The engine operates on a system devised by S. B. Whiting, formerly manager of the company. To overcome the dangerous strain caused by unequal wearing, Walker differential rings have been placed on the sheaves, with excellent results, the cables taking 4 complete turns around the driving sheaves.

Equipment at the amygdaloid shafts on the Osceola lode is practically the same at shafts 13, 14, 15, 16 and 17, the new shaft, No. 18, having a combined engine and boiler-house with a small Lidgerwood hoist. Shafts 13, 14 and 15 have large stone engine-houses, with a steel engine-house at No. 16. Shafts 13 to 17, inclusive, have Nordberg first-motion double conical-drum hoists, operating 10-ton skips in balance, good for 5,000′ depth each. All engine-houses have air connections with the main compressor plants at the old mine, and shafts 13, 14, 15, 16 and 17 have permanent shaft-rockhouses of the same general design as at the conglomerate workings.

The machine-shop, 225x250′, largely rebuilt in 1907, has an equipment that is excelled by only a few of the largest shops in the country, including a 25-ton electric traveling crane and mammoth planers, electric power being used throughout. These shops are capable of handling anything and everything in the line of repair work, and also have complete manufacturing facilities for the making of mining, milling and smelting machinery, and have

turned out hundreds of Wilfley tables and other special machinery, under agreement with the owners of the patents.

The foundry, 78x96', has 2 iron cupolas and a brass foundry, with a 20-ton electric traveling crane.

The pattern shop, just north of the foundry, is of brick and steel, divided into 2 compartments, one for the shop proper and one for the storage of patterns.

The carpenter-shops are of great size, and are equipped with as complete a line of labor-saving machinery as can be found in any general woodworking establishment.

The blacksmith shops are of larger size than may be found elsewhere, except in the works of a few of the very largest manufacturers of machinery, and are equipped with steam hammers, forges, blowers, emery wheels, etc. The Calumet smithy alone sharpens upwards of 50 tons of steel drills daily, requiring the services of a small regiment of drill-boys between the shops and mines. The Hecla blacksmith shop does general blacksmithing and forging for the entire mine, a stone addition of 66x152' having been built to the Hecla shop in 1903. The various shops of the Calumet & Hecla employ upwards of 100 blacksmiths.

A timber mill at the mine mortises and tenons the bed-pieces, legs and sills of the square sets that are used underground, and furnishes blocks and ridges.

The electric building at the mine is 74x74', of stone, housing the old electric power and lighting plant, but the main electric plant now is at the mine in Lake Linden.

Warehouses include a very large brick building for general supplies, and metal warehouses for steel and iron, oil, paint, etc., the main buildings having direct rail connections. There are also barns and a considerable number of miscellaneous structures, required in connection with the operation of the mine.

The office building is a large and handsome stone structure, housing the various executive departments and engineering force of the mine. The company's private telephone system has an exchange with about 150 instruments, including a number of deep underground stations, with local and long-distance connections.

The company maintains a large hotel and a fine stone clubhouse for employes, the latter containing bath-rooms, bowling alleys, etc. The changing houses for the miners, at the various shafts, are well equipped with hot and cold running water, bath-tubs, lockers, etc.

The Calumet & Hecla library, of more than 30,000 volumes, contains books, periodicals and newspapers printed in a score of languages, about 30 different nationalities being represented on the company's pay roll. There also is a library and clubhouse at Lake Linden, for stamp-mill and smelter employes.

The company maintains a hospital, for employes solely, built 1898, noted for its complete surgical and laboratory apparatus. Nearly a dozen physicians on the hospital staff are at the call of any employe, or any member of his family that may require medical or surgical attendance.

The company owns about 1,200 dwellings, rented to employes at an average price of 6% on actual cost, plus cost of maintenance, and upwards of 200 dwellings are owned by employes on lands leased from the company at nominal yearly rentals.

There are 8 schoolhouses on the lands of the Calumet & Hecla, most of which were built by the corporation, including a fine manual training school, and a truly magnificent high school building at Calumet.

On Calumet & Hecla lands there are upwards of 30 churches, occupie a dozen different denominations. All of these sites were donated by the pany, and in most cases substantial aid has been given in their erection maintenance, entirely regardless of creed.

The company maintains 3 distinct systems of waterworks, one at mines in Calumet, one at the mills in Lake Linden, and one on the shor Lake Superior, 4 miles from Calumet, the latter pumping water for dom uses, against a head of 600′, raising about 4,000,000 gallons daily. Electri was substituted for steam, 1908, at this plant, and the pipe-line is to be tinued to Lake Linden, to furnish Lake Superior water for the boilers of new power plant. At the Calumet dam and mine there are 7 pumps, havi combined daily capacity of upwards of 45,000,000 gallons.

The company maintains a complete fire department, modeled on me politan lines, which affords protection to the mine buildings and location, responding to calls from Red Jacket, Laurium and the other towns that g make up the mining camp of Calumet, of 40,000 population, that has gr up around this great property.

The Hecla & Torch Lake railroad, owned by the company, connects mines, mills, smelter and shops by upwards of 20 miles of main tracks, s and sidings, reaching every shaft, shop, warehouse, mill and furnace. 5-ton wooden rock-cars formerly used were replaced, 1908, by 150 forty steel rock-cars, and the line was widened to standard gauge, 1907, by the dition of a third rail. Three new locomotives were bought and the old row-gauge locomotives rebuilt to standard gauge in the company's shop

The stamp mills are at Lake Linden, 4 miles from the mine, on a tra 998 acres having several miles of frontage on Torch Lake. There are 2 known as the Hecla and Calumet, each originally having 11 Leavitt st stamps with 14x21½″ cylinders and 24″ stroke. A 165x308′ steel additi the Hecla mill, with 6 stamps, was built in 1903 and, upon its compl the rebuilding of the 2 old mills was begun, each being divided into 2 tions, with one section rebuilt at a time, each section requiring approxim one year for completion, remodeling being completed in 1907. Great as the cost of this work, the new mills practically had paid for themselves completion, through reduced cost of operation and increased saving of co While the mills are termed rebuilt, they actually are entirely new mills, s ing upon the old sites, practically nothing of the old material having utilized. The new mills handle rock with about 60% of the wash-water merly required, thus effecting a double saving, inasmuch as all water us the mills first must be pumped in, and thereafter raised as sludge, by the wheels, for discharging.

The new mills, built by the Wisconsin Bridge & Iron Co., have steel frames, with concrete foundations, cement floors, corrugated iron s and Carey roofs of tarred burlap. Foundations are much heavier than i old mills, and the wash-room below the heads is much greater. Founds are of very massive piles, spaced 20″ apart, with 2 and 3 tiers driven to rock and topped with 6x12″ square timber, capped by a 4′ 6″ bed of con The mills have 29 Leavitt heads and 1 Nordberg steeple-compound hea which 28 heads are in commission regularly, with 2 in reserve, 20 heads ing conglomerate rock and 6 crushing amygdaloid rock. Stamps are act by steam power, except the 6 stamps in the Hecla addition, which have pendent 25-h. p. motors each, but the other milling machinery is ope electrically. The Leavitt heads have a daily capacity of about 400 to conglomerate, 500 tons of Osceola amygdaloid or 550 tons of Kearsarge a daloid.

The mill equipment includes, below the stamps, Woodbury-Benedict jigs; ten 4-deck Evans-Rawlings round-tables, from which slimes are treated by 96 Wilfley tables; Chilean regrinding mills, Averly grinders and classifiers, there being a total of 220 Wilfleys, which effect a considerable saving of the very fine copper formerly lost, and greatly reduce the water consumption. By special arrangement the Wilfleys were built in the company's shops.

The regrinding plant, built 1908, occupies a steel building 195x340′ in size, and is of circa 1,500 tons daily capacity. Equipment includes 48 Chilean mills, set on massive concrete piers, and 200 Wilfley tables, latter built in the Calumet & Hecla shops. There is an electric traveling crane and a 50′ sand-wheel is to care for the tailings. The experiments in regrinding at the mills proved so successful that the new plant has been built, to treat about 20% of the tailings from the stamp-mills.

As the mills stand on the flat western shore of Torch Lake, but little above water level, tailings speedily filled the shallow lake for some distance off shore, and to waste the sand it became necessary to secure a considerable initial elevation, which is gained by sand-wheels. The material entering the mills as conglomerate rock leaves as coarse sand, to the extent of fully 8,000 tons daily. The sludge is washed through launders to the sand-houses, where it is scooped up by the buckets of the wheels and dumped, high above, into launders running on trestles far out into the lake, these spouting forth miniature brick-red Niagaras. There are two wheelhouses, one for each mill. The Calumet wheelhouse has sand wheels of 40′ and 50′ diameter, and the Hecla wheelhouse, caring for the sands from a much larger mill, has sand-wheels of 50′ and 64′ diameter, the latter being housed in a three-story steel annex, 78′ on the ground and 94′ high. The old wheelhouses are of wood, iron-sathed. The steel in the annex to the Hecla wheelhouse weighs 490 tons, the building is equipped with a 45-ton Sellers traveling crane. The sand wheel is to appearance a gigantic bicycle wheel, fitted with a spur gearing where the rubber tire should be. The complete wheel weighs 500 tons, and is mounted upon massive concrete masonry. Four 25-ton iron bed-plates support the pillars carrying the 21-ton Krupp forged steel axle, which is 27′ long and 32″ in diameter with a hollow core of 26″ diameter. Radiating from axle are 2″ steel spokes 32′ long. The rim is in 20 segments weighing 10,700 each, the inner perimeter of the wheel having 550 buckets, in pairs, each wide and 4′ 6″ long, and holding 100 gallons, giving the wheel a capacity of 55,000 gallons per revolution. The completed wheel is 10′ wide and 64′ in diameter, driven by gear and pinion, power being furnished by a 700-h. p. motor. Nearly two years were required to build and adjust this monstrous wheel. Foundations for another wheelhouse were begun April, 1908, and another sand-wheel of 50′ diameter is to be installed.

The tailings at the Lake Linden mills are the most extensive in the world, containing nearly 40,000,000 tons of stamp-sand, carrying about 8 to 10 lbs. copper in the newer sands, the older tailings having 12 to 20 lbs. of copper per ton, and there probably is fully 250,000 tons of copper in these sands. Extensive experiments at reworking the tailings have been made, from time to time, but without success. By reason of the included copper, which can be extracted only through regrinding, and the rapid oxidation of the metal in the tailings, the problem of economical extraction is not simple, and yet lacks a solution.

The new boiler-house, of steel frame, 108x220′, with two 200′ self-supporting brick-lined steel smokestacks, is planned for twenty 500 h. p. Babcock-Wilcox tubular boilers, with 15 in place. The old boiler-house is to be demolished. The power-house has coal crushers, feeding an endless link-belt system with

308 steel link buckets, of 60 tons hourly capacity, which takes the co overhead bins, from which it is fed to the grates by Roney automatic sto Water requirements at the new boiler plant are about 650,000 gallons e and water is secured from a reservoir, artesian wells and Torch Lake, a through a Jewell filtration plant of 500,000 gallons daily capacity, in w impurities are precipitated by lime, but the new plant is to take water a large reservoir, fed from Lake Superior via the Calumet pipe-line.

The new power plant at Lake Linden furnishes electric energy fo mine, as well as for the mills, the electrification of the property having b in 1904. It is the plan of the company eventually to use electric en throughout the mine and works, wherever practicable, though in the ca some of the big compounded hoists, a change from steam to electricity w be doubtful economy, as well as necessitating enormous initial outlays. St progress has been made in the application of electric energy, and the will be completed in the near future. Eventually practically all the mac ery of the company, except hoists, air-compressors and stamps, will be oper electrically.

The central power station, of steel, is located at the mills rather than the mine because fuel can be delivered alongside from the largest ves plying the great lakes, effecting a saving of about 10 cents per ton on tra portation cost of coal formerly burned at the mines, with a much grea saving in the case of isolated plants lacking rail connections. There also be a saving in slack, resulting from one less handling of the coal. Some the former steam installations consumed as much as 4 pounds of coal horsepower-hour, while the new electric plant requires approximately pounds per horsepower-hour. There are numerous other economies result from a central electric power plant, especially in labor, the company forme employing 100 firemen in its various power plants. The coal consumption the Calumet & Hecla, at its mines, mills and smelters, is about 250,000 t yearly. Machinery at the power plant includes the old engines Saginaw Gratiot, the former an Allis-Chalmers twin vertical tandem compound-exp sion engine having 17x40x48" cylinders, each engine being direct connec to a 1,000-kw. alternating current generator. The completed plant will ha in addition, the Leavitt engines Owego and Ontonagon, of 3,000 h. p. ea built originally for hoisting purposes, direct-connected to 2,000-kw. generat There is room for a third 2,000-kw. generator, which will give a total capac of 8,000 kw., equal to more than 10,000 h. p. The electric equipment of mills includes 15 motors of 20-h. p. to 250-h. p. each.

Water for the mills is supplied by 5 pumps, of which the Michigan is most powerful in the world, having a daily capacity of 60,000,000 gallons. daily capacity of the engines Huron and Ontario is 20,000,000 gallons ea of the Erie 10,000,000 gallons, and of an I. P. Morris pump, 22,000,000 gall

Miscellaneous buildings at the millsite include a 50x100' steel fra smithy, 48x175' warehouse, machine-shop, carpenter-shop, paint-shop and s dry other shops required in connection with the works.

The Torch Lake smelter is at Hubbell, about a mile south of the m on a 30-acre site having ample water frontage, shipping facilities includ deep water in front and 3 railways at the rear. The smelter has 4 furn buildings, each 80x130', and a 50x70' blister copper furnace building. the reverberatory and blast furnaces have been rebuilt within the past years, there being 11 reverberatory furnaces, with 93' stacks. Reverberato are top-charged, having platforms above on which the mineral is thorou dried before smelting. The largest blast furnace is 40x96" at the tuy its comparatively small size being due to the use of reverberatory furn

for the bulk of the smelting work required in the process of reducing the native copper mineral treated. The practice at the smelting plant is fully abreast of the times, in all essentials.

The smelting works have 3 mineral-houses, with a combined storage capacity of 18,000 tons. Calumet & Hecla mineral now carries less than 60% copper, being dressed much lower than formerly, to effect the saving of the very fine copper previously lost in the slimes.

The power plant at the smelter has three 125-h. p. boilers, and a fourth boiler, in the cupola building, generates steam by the combustion of waste gases from the reverberatory furnaces. A small electric plant has an 85-kw. generator, with a 25-kw. generator in reserve.

The smelting works have a 2-story assay office and laboratory, 40x42' with a 14x14' wing, exceptionally well arranged and complete in equipment. There also is an office and a large warehouse for supplies.

The eastern reduction plant, known as the Buffalo Smelting Works, at Black Rock, in the northern part of Buffalo, is located on the Niagara river, with deep water in front and direct rail connections in the yards. The works include the reverberatory and blast-furnace buildings, an electrolytic plant, 2 large mineral storage houses, office, laboratory and coal-sheds. The works are well arranged, but have grown to nearly the capacity of the site, and soon will require more room. A 30-ton electrolytic refinery, originally installed for experimental purposes, has grown to large size, with 700 tanks having multiple arrangement of electrodes, and it is planned to increase its capacity to 30,000,000 lbs. of anodes yearly. Formerly only high grade mineral was shipped to the Buffalo works for smelting, but at present all grades of mineral are treated at both plants, though the mineral from the deeper workings of the Calumet & Hecla, which is decidedly arsenical, is treated exclusively at the Buffalo works, by electrolysis, which effects the saving of considerable silver, formerly lost. The Buffalo plant employs about 150 men.

A fleet of steel steamers and barges is operated by the company, carrying mineral east and bringing back return cargoes of coal, this fleet including the fine steel steamer Geo. A. Flagg, of 3,300 tons register. Sufficient mineral is shipped to the Buffalo works, during the open season of navigation, to keep the plant operating steadily from December till May, during the closed season.

The dock system of the Calumet & Hecla is extensive, including a series of very large coal-sheds at Lake Linden, with one of 200,000 tons capacity, the old sheds being of wood and the new of steel. There is a series of docks at the mills and smelts on Torch Lake, all with substantial wharves having at least 21' of clear water alongside, frequent dredging being required to maintain this depth of clear water, owing to stamp-sand filling in. The wharves were extended, 1904-1905, both at Lake Linden and Hubbell. The 750' coal wharf has 11 Hunt hoists and three 52' movable derricks, one of wood and two of iron.

The Calumet & Hecla owns and operates the ship-canal connecting Torch Lake with the government waterways on Portage Lake, this canal being 21' deep and accommodating the largest vessels plying the great lakes. Tolls, ranging from 10 cents on soft coal to 50 cents per ton on package freight, are charged by the company, on independent cargoes entering Torch Lake through this canal.

A sawmill, at the head of Torch Lake, receives logs by rafts, and ships sawed lumber and timber by a branch of the Hecla & Torch Lake railway. The company has sawmills at Ashland, Wisconsin, and Sheldrake, Michigan, both on the southern shore of Lake Superior, the latter having a capacity of 25,000,000' of sawed lumber yearly, with several years' supply of standing

timber tributary thereto. The company owns
lock and hardwood timber along the southern
land carrying about 500,000,000′ of standing ti
a long-term timber contract with the Keweenaw
extensively of jobbers, the requirements for under
about 30,000,000′ annually, in addition to the ma
lumber used on surface, at the mines, mills and

An aid fund for employes, instituted 1877,
chosen by the workmen, pays death and disabili
having been disbursed since the formation of the
the sick and injured, or to families bereaved of th
dent or disease. Surplus monies accumulated in this
in the company's shares, bought on the open mark
have been highly profitable. Disbursements from t
$75,000 yearly. For the maintenance of this fund eac
monthly, and the Calumet & Hecla adds an equal am
said to have established, 1907, a pension fund for sup
long and faithful service.

Beginning with the new century, the policy of the
been one of expansion. Almost from its birth it was th
ducer of the world, and the most profitable mine of any
was progressive, leading all other mines in the introduct
machinery and modern methods, but was self-contained a
was seen, however, in 1901, that the old mine, great as i
an end sometime, hence a radical change in policy, whic
struction of its mills, many changes in mining practice,
of all, the acquisition of mineral resources outside of the
to the opening of a fine new mine on the Osceola amyg
tract, and the tentative opening of a mine on the K
Some excellent team work, led by Messrs. Agassiz, Liver
ton, has been done by the responsible heads of the con
quence the Calumet & Hecla, instead of being the decad
would be in 1909, but for this work, continues well at th
duction and earnings. Costs have been reduced largely,
in innumerable ways. The growth of the property, duri
has been well balanced, every department having been
degree of efficiency. Operating costs have been largely
ting wages, while charging millions of dollars for new
operating expenses, and despite the decreasing percenta
deepened mines, the cost of making a pound of copper
almost 11 cents in 1901, to about 8.25 cents in 1906.

The policy of acquiring new mines, either through d
control of stock, begun in 1904, has been adhered to
Calumet & Hecla now is in control of two promising nei
these being the Centennial and Allouez, and, although th
failure of working the Calumet conglomerate, it is prob
this bed can be worked profitably, on Centennial ground
Hecla, though the task would be hopeless if attempted
company. The Calumet & Hecla also is likely to be in c
southern neighbor, the Osceola, which also has extensive
of the Centennial and Allouez, to the north. The Sup
Houghton, is developing a fine mine on the Baltic amy
considered a large and permanent asset of the Calume
Salle, south of the Osceola, remains in a development

CALUMET & MONTANA DEVELOPMENT CO. MONT

Dead. Formerly at Helena, Lewis & Clark Co., Mont.

CALUMET & MONTANA MINING CO. MONT

Office: Duluth, Minn. Mine office: Dillon, Beaverhead Co., Mont. Clark, president; Wm. Buchanan, first vice-president; Gust Levine, s vice-president; John Cox, secretary; Solomon Goldberg, treasurer; prec officers, Thos. Bastian, J. J. Lefevre and Angus McDonald, directors; Jas. Lanyon, superintendent. Capitalization $300,000, shares $1 par.

Lands, 6 claims, area 120 acres, in the Copper Queen district, nea Idaho line, including the Dark Horse mine at the head of the Big Hole, ha tunnels of 125′ and 160′, and a 2-compartment 200′ shaft, with circa 1,8 workings, developing a 5′ fissure vein carrying auriferous and argentif chalcocite and bornite of excellent grade. Property shows 3 practically p lel fissure veins, of circa 12′, 15′ and 22′ width. Test shipment, to Salt smelter, gave returns of 18% copper, 7 oz. silver and 66 cents gold per and ores shipped, 1907, to Washoe smelter, averaged 21.4% copper, 7 silver and 38 cents gold per ton. Equipment includes two 50-h. p. boile hoist good for 1,000′ depth, and a 2-stage Sullivan air-compressor. Pro considered promising.

CALUMET & ONTARIO DEVELOPMENT CO. ONTA

Office: Calumet, Mich. Letter returned unclaimed from former office, Massey Station, Algoma, Ontario. Lands, sundry claims near the mina mine. Idle for several years and apparently moribund.

CALUMET-PINAL MINING CO. ARIZ

Office: 1267 Broadway, New York, N. Y. Mine office: Red Rock, P Co., Ariz. Chas. Doty, president; G. E. Crawford, secretary; Hon. Not Guild, superintendent. Organized July 3, 1905, under laws of Arizona, capitalization $1,000,000, shares $1 par.

Lands, 12 claims, area 240 acres, and a 5-acre millsite, in the Owl district, 15 miles northeast of Red Rock. Mine was opened 1879, and wo in a desultory way, to depth of 85′, producing circa $60,000 worth of The 96′ Yankee Girl shaft is opened in porphyry showing deposits of me grade ore. The 135′ Cloud Burst shaft develops a vein between porp and slate, carrying sulphide ore of good average tenor. Property is consid promising with a good local management.

CALUMET & PITTSBURG MINING CO. ARIZ

Dead. Merged, 1907, in Superior & Pittsburg Copper Co. Formerl Bisbee, Cochise Co., Ariz. Very fully described Vol. VII.

CALUMET & SAULT STE. MARIE DEVELOPMENT CO. ONTA

Office: Calumet, Mich. Letter returned unclaimed from former office, Massey Station, Algoma, Ontario. Fred. Roehm, president; Wm Ashton, superintendent. Lands, near the Hermina, have a 100′ shaft, sho a vein of 14′ reported width, carrying auriferous chalcopyrite. Idle se years and apparently moribund.

CALUMET & SONORA OF CANANEA MINING CO., S. A. MEX

Is the Mexican incorporation of the Calumet & Sonora Mining Co.

CALUMET & SONORA MINING CO. MEX

Office: 606 Sellwood Bldg., Duluth, Minn. Mine office: La Can Arizpe, Sonora, Mex. Jerome E. Cooley, president; Jas. W. Norton, first president and general manager; B. Silberstein, second vice-president; Ho V. Eva, secretary; Chas. W. Ericson, treasurer; preceding officers, Wm Underhill and H. E. Prudden, directors; Forbes McRae, superintendent; T M. Dunlop, assistant superintendent. Organized May 14, 1903, under law Minnesota, with capitalization $600,000; capital increased to $3,000,000, s

$10 par. Direct title to lands is held through a Mexican corporation, the Calumet & Sonora of Cananea Mining Co., S. A. Annual meeting, second Tuesday in October.

Company began business with 173 acres of land, and has increased its holdings to 1,146 acres, all in the Ronquillo district. Properties are the Buena Vista group of 306 acres, Catalina group of 630 acres, and Ronquillo-Duluth group of 210 acres, principal developments being on the Catalina.

The Buena Vista group, near the Greene-Cananea, has the 100′ Underhill shaft and the 293′ Norton shaft, with a 552′ crosscut tunnel, showing a vein of 57′ width, carrying sulphide ores with talcose gangue assaying 1.25 to 1.75% copper.

The Catalina group has 2 old shafts of circa 75′ each, and a new shaft of 300′ depth, with about 900′ of workings, showing ore, from surface, of good average grade. A 16-ton test shipment returned 3.64% copper, 53% lead, 113 oz. silver and $20 gold per ton.

The Catalina group has a 150-h. p. equipment, and a townsite has been platted adjoining the Bonanza de Cobre mine, with a lumber yard. Company is free from debt, meeting all obligations monthly, and Aug. 1, 1908, had on hand, $13,000 cash. Employs 71 men. Company continued active development during the period of depression, in 1907. Property considered promising and management good.

CALUMET & TEXAS MINING CO. **TEXAS.**

Office: Cedar Rapids, Iowa. Mine office: Carlsbad, N. M. John H. Shary, president and general manager; Wm. Fullerton, secretary and treasurer; W. G. Woerner, general manager. Organized, May, 1901, under laws of New Mexico, with capitalization $250,000, shares $1 par. Lands, 36 claims, area 720 acres, also 640 acres of oil lands, in the Guadalupe Mountains, El Paso county, Texas, 64 miles southwest of Carlsbad, nearest railroad point, showing carbonate ore assaying 20% copper, 5% lead and 1 oz. silver per ton, with a trace of gold, opened by tunnels of 40′, 200′, 210′ and 328′. Has expended about $30,000 and claims to have $500,000 worth of ore developed. A 23-ton test smelter shipment returned 19 to 24% copper. Idle several years.

CALUMET & YAQUI RIVER COPPER CO. **MEXICO.**

Letter returned unclaimed from former office, La Cananea, Sonora, Mex. Mine office: Soyopa, Ures, Sonora, Mex. H. C. Rolfe, president; Geo. H. Nalte, secretary; W. J. Elliott, treasurer. Organized Apr. 28, 1903, under laws of Arizona, with capitalization $3,000,000, shares $10 par. Apparently a successor of Santa Marguerita Mining Co., and bought lands of the Venice Copper Co., 7 miles from Soyopa, area 85 hectares, opened by a 1,200′ tunnel, showing copper sulphides of fair tenor at shallow depth. Is said to have a 50-ton smelter. Presumably idle.

SOCIÉTÉ DES MINES DE CUIVRE DU CAMAQUAM. **BRAZIL.**

Office: Brussels, Belgium. Mine office: Camaquam, Rio Grande do Sul, Brazil. Organized 1900. Lands, circa 80 kilometers from Rio Negro station of the Southern Brazilian Railway, and 3 kilometers from the Rio Camaquam, show an intrusive core of melaphyr, surrounded by conglomerate and sandstone, carrying fissure veins which are narrow but rich in the conglomerate, but wider in the sandstone, veins averaging about 4′ in width, but lacking regularity, and even continuity. The oxidized zone is shallow, the secondary zone carrying considerable chalcocite and bornite, with gangue of quartz and occasional barite. The ore below the shallow zone of secondary enrichment is mainly chalcopyrite, associated with pyrite and showing occasional particles of chalcocite and dendrites of native copper. Four veins worked average 4′ in width and carry circa 6.5% copper and 30 grams gold per metric ton. Mine

is opened by 3 adits, having backs of 300′ to 350′, and a fourth adit is p to be driven 3,300′, to cut additional veins shown at surface.

Equipment includes a fair mining plant with hydro-electric power i tion, taking water from a dam 453′ long and 53′ high, holding sufficient to run the mill for the entire year, as there are long droughts occasi All ore is hand-sorted, selected ore assaying about 30% copper. Gangu is discarded, and remainder, averaging about 70% after hand selection, centrated in an 80-ton mill with hand-jigs to an average of about 28% tenor. Smelter has a small matting furnace. Production, 1904, was 90 tons of 28 to 30% ore monthly, shipped to England for smelting, and 225 tons monthly of matte of 45 to 50% copper tenor. Production, 1 estimated at 2,000,000 lbs. fine copper.

CAMBRIA COPPER CO. NE

Mine office: Aurum, White Pine Co., Nev. Owen Pritchard, s tendent. Lands, 4 claims, area circa 80 acres, known as the Texas gr Muncey creek, Spring Valley, in the Silver Mountain district, circa 3 north of Ely, also 10 miles of water rights on Muncey creek, and 580 a ranch lands. Has shipped carload lots of ore to Salt Lake smelter ret 22.55 to 23.4% copper.

CAMBRIAN CONSOLIDATED MINES, LTD. W

Dead. Wound up, September, 1904. Formerly at Caerwych, Mer Wales. Described Vol. V.

CAMBRIAN COPPER MINING CO., LTD. W

Dead. Voluntarily wound up, February, 1903. Formerly at Cae Merioneth, Wales. Described Vol. III.

CAMBRIAN MINING & MILLING CO. CALIFO

Dead. Formerly at Placerville, Eldorado Co., Cal. Described Vol.

CAMBRIDGE COPPER MINING CO. NORTH CARO

Dead. Formerly at Jamestown, Guilford Co., N. C.

MINAS DE CAMPANARIO. S

Office: care of Don Antonio Guijarro Orta, Huelva, Spain. Mine Valverde del Camino, Huelva, Spain. Lands are a group of 6 properties 87 hectares, on which there is a considerable body of low-grade cupri iron pyrites.

CAMPECHANA TRIUMVIATE CO. ME

Mine office: León, León, Guanajuato, Mex. Mine has blocked out erable ore carrying 2 to 3% copper, 2 to 5% lead and about 300 grams per metric ton. Is said to have bought machinery for a 50-ton concen

CAMPERDOWN GROUP. WYO

Mine office: Saratoga, Carbon Co., Wyo. Lands, north of the C land group, on the southern slope of Coad Mountain, are said to have showing of copper ore, somewhat resembling that of the Cumberland Idle.

SOCIEDAD ANONIMA COBRES DE CAMPÓO. S

Office: Santander, Spain. Mine office: De Soto, Santander, Spain Alberto Gutiérrez, president; Don Luis Torres Quevedo, secretary. Idl

CAMPO SECO MINES. CALIFO

Owned by Penn Chemical Works.

CAMPRODEN COPPER SYNDICATE, LTD. S

Offices: 3, Lord St., Liverpool, Eng. Moribund.

CAÑADA DEL ORO MINING & DEVELOPMENT CO. ARI

Letter returned unclaimed from former office, care Maj. W. A brough, secretary and manager, Tucson, Ariz. Mine office: Oracle, Co., Ariz. Eugene S. Dives, president; Louisa M. Matos, treasurer; pre

officers, A. C. Waters and Uri Embody, directors. Organized 1906, with capitalization $1,000,000. Lands, 23 claims, in the Cañada del Oro district of the Santa Catalina Mountains, showing well defined ore bodies, having 7 shafts and tunnels, with about 1,000′ of openings, showing ore said to give assays of $51.75 to $181 per ton, in lead, copper, silver and gold. Presumably idle.

CANADIAN-AMERICAN MINING CO. **BRITISH COLUMBIA.**

Mine office Gribbell Island, Skeena River division, Cassiar district, B. C. Company succeeded the Eureka Copper Mines, Ltd. Lands, 7 claims, 3 fractional, with geological conditions markedly similar to those of the copper belts of Texada Island. Mine has tunnels of 40′ and 600′, and a 200′ shaft, with 2 levels opened, showing mainly bornite, in crystals of varying sizes, disseminated in garnetite and feldspar, with footwall carrying a little chalcopyrite, as impregnations, to a considerable depth. Ore is auriferous, and of medium copper tenor. Has steam power, employing circa 20 men, and has produced about 2,000 tons. Shipments, 1906, of 940 tons to the Trail smelter returned circa $14 per ton.

CANADIAN CONSOLIDATED MINES, LTD. **BRITISH COLUMBIA.**

Dead. Title changed, 1906, to Consolidated Mining & Smelting Co. of Canada, Ltd. Formerly at Trail, Trail district, B. C.

CANADIAN CONSOLIDATED MINING & SMELTING CO. **BRITISH COLUMBIA.**

Mine office Nelson, Kootenay district, B. C. Lands, 7 claims, 3 fractional, on Forty-nine Creek, bought, 1906, of Eureka Copper Mines, Ltd., having a 200′ shaft showing a considerable body of auriferous copper ore of fair grade. Has steam power. Former owner shipped about 1,000 tons of ore to the Trail smelter.

CANADIAN COPPER CO. **ONTARIO.**

Office: 2402-43 Exchange Place, New York, N. Y. Mine and works office: Copper Cliff, Algoma, Ont. A. P. Turner, president; F. S. Jordan, vice-president; J. L. Ashley, secretary and treasurer; Capt. John Lawson, general superintendent; David H. Browne, metallurgist; Capt. Thos. Travers, mine superintendent; E. W. C. Perry, superintendent of roast-yard; Wm. Hambly, superintendent Creighton mine; C. F. Griswold, superintendent Crean Hill mine. Organized Jan. 6, 1886, under laws of Ohio. Is controlled, through ownership of nearly the entire stock issue, by International Nickel Co.

The Canadian Copper Co. is the world's largest nickel mine, and is a copper producer of present importance and even greater future promise. Ore was discovered 1882, and the first mine opened in 1886. Lands are extensive, including mineral holdings in the districts of Algoma and Nipissing. Protracted diamond drill borings have shown large reserves of ore. Principal ore bodies are irregular contact deposits in basic igneous rocks, mainly diorite and granite, carrying a mixture of chalcopyrite, pentlandite and pyrrhotite, returning 1 to 4% copper and 2 to 6% nickel, with an average of 2 to 2.5% copper and 4 to 5% nickel.

The Creighton mine, employing about 200 men and producing circa 800 tons of ore daily, 1906, has 2 shafts, but extraction is mainly from an immense open pit, circa 225′ wide, from foot to hanging, about 500′ long and 150′ deep. The pit has 13 railroad tracks, converging to an entry on the footwall that leads to an incline shaft. Ore is broken in steps, and thrown to the bottom, where block-holed and trammed to the shaft. Drill borings prove the Creighton ore body to extend some distance west of the pit. A new shaft, No. 2, sunk in the granite, about 500′ west of the old shaft, has 3 compartments, with walls concreted for about 40′ depth from the collar. No. 2 shaft has a rockhouse, 42x46′ on the ground and 72′ high, of reinforced concrete to the

bin floor, above which the walls are of 3" planks, 10" wide, spiked toge
The rockhouse equipment includes two 18x30" Blake crushers and a pic
belt 3' wide and 50' long.

No. 2 mine, which produced circa 200 tons daily, 1906, was idle,
though kept free of water.

The Crean Hill mine, about 2 miles east of the Victoria mine, has
diamond-drilled extensively, showing a series of lenses of 50' to 80' w
containing a much larger portion of pentlandite than any of the other m
ore requiring different treatment from the massive ores found at the Creig
and Stobie mines. The Crean Hill is opened by a 4-compartment 300' s
sunk at an angle of 57°, and concreted to a depth of 40'. Equipment incl
a rockhouse similar to that at the Creighton.

The Stobie mine, in Blezard Township, 4 miles north of Sudbury, has
similar to those of the Creighton, and is an important producer.

Miscellaneous mines include the Evans, McArthur, McDonald, Clara
A and B and various other workings. There is a quartz quarry, about
miles southeast of Naughton, producing about 150 tons of quartz daily,
for fluxing and lining converter shells.

In 1908 the company built large new shops, including a machine-s
smithy and foundry under one roof, and a large carpenter and pattern
There is a fire-proof laboratory building, of concrete and brick, 35x8
stories high, with one of the best equipments to be found at any metallur
plant. At the Creighton and Crean Hill mines there are 36x80' cha
houses, with concrete floors, brick walls and tile roofs, having separate loc
for each man, with enameled basins and shower baths.

Electric power is used throughout the mine and works. The develop
of power is through a subsidiary corporation known as the Huronian C
pany which has a hydro-electric installation at High Falls, on the Sp
river, utilizing an effective head of 85' with total available energy of a
14,000 h. p., of which about half is now developed. The power-house at
Falls is 55x106', of brick and concrete. Installation includes two 3,550-
turbines, with speed of 375 revolutions per minute, each direct-connected
2,000-kw., 2,400-volt, 3-phase, 25-cycle generator, with space for 2 additi
units, of which one is under construction. The transmission line, of abou
miles length, has double sets of poles, spaced at 130' intervals, carrying 6
No. 1 copper wires. At Copper Cliff there is a 100x200' sub-station, where
current is stepped down to low voltage, and distributed to various m
about the mines and works.

The Creighton mine has an air-compressor with piston efficiency of
cubic feet of free air per minute, driven by a 300-h. p. 550-volt constant-s
induction motor. The Creighton mine is operated exclusively by electr
for hoisting, crushing and other work.

Water for general use and fire protection is stored in a 60,000-gallon
tank.

A private railroad line, connecting the principal mines with the re
yards and works, has two 80-ton locomotives, hauling 50-ton drop-bo
dump-cars, and a brick roundhouse.

Ore is heap-roasted, in yards near the town of Copper Cliff. Roast-h
of circa 5,000 tons size are built up by unloading raw ore from wheelbarr
The company has experimented extensively with the size and shape of ro
heaps, obtaining best results from heaps requiring about 3 months' roast
Roasted ore is loaded from heaps by steam-shovels and taken to the sme
by rail.

The smelter, at Copper Cliff, 6 to 20 miles from the various mines, i

2,000 tons daily capacity. These works were perhaps the first to use the Bessemer process for treating nickel ores. The new plant has taken some ideas from the Tennessee Copper Co., but none from the Mond Nickel Co., mixed charges of raw and roasted ores being a modification of the Tennessee process. A limited amount of custom smelting is done, but no mispickel is treated.

The smelter, which is served by electric locomotives, has 35x700′ ore-bins, of 15,000 tons capacity, and a blast-furnace building 85x375′ in size, with five 600-ton blast-furnaces, each 50x204″ at the tuyeres, with 2 tiers of water-jackets, the lower being 8′ 6″ and the upper tier 6′ in height, furnace having a total height of 35′. Slags flow from the back of the settlers into 22-ton cast-iron slag-pots, which are made in sections, with 4 side pieces and a separate bottom piece.

A new converter building, built 1907, is 60′ from the cupola building and parallel therewith, having a 60x280′ main structure, with a shed 35x280′ for matting, casting and sculling, and at one end is the relining department, 84x112′ with a 35′ shed on each side, having a continuation of the crane-run of the main building, with storage for material, etc., entire length of the converter building being 522′. The structure is of steel frame, with corrugated sides and roof, having two 50-ton Morgan electric traveling cranes, of 55′ 8″ span, and a 20-ton auxiliary hoist. Matte from settlers in the blast-furnace department is poured into cast-steel moulds, 5′ in diameter and 5′ deep, and taken by electric crane to the converters, there being 10 stands, with 10-ton shells, 84x126″, of the Anaconda type. First fusion product of the blast-furnaces is a matte of 30 to 35% tenor in combined nickel and copper, the second fusion product, from the converters, being an 80% nickel-copper matte. Stands are controlled electrically from 2 pulpits, each handling 5 stands, each stand having a 30-h. p. induction motor, with solenoid brake. Blowing is precisely the same as in treatment of ordinary copper matte, except that the blast is cut off as soon as the iron is fully eliminated. The copper and nickel behave as one metal, similarly to copper alone, up to the final elimination of sulphur and iron. Matte is taken from the converters in clay-lined ladles, by crane, and poured into moulds under the shed roof. Slag from converters is poured into steel slag-pots, lifted by crane to slag-cars and taken to the slag-casting machine, which consists of a circular steel framework, of 58′ diameter, on a circular track, carrying cast-iron moulds, forming a continuous flat ring. The moulds, 4x12x30″, holding 150 pounds of slag each, are mechanically rotated under the stream of slag. The cast bricks are allowed to cool before the moulds reach a hand-controlled tripper, which reverses the moulds, dropping the bricks into a hopper, a chute from the hopper discharging the slag-bricks into a skip, that carries them up an inclined track to a 500-ton steel bin above the charging tracks leading to the blast-furnaces.

The lining department has a silica mill and extensive bins for storage of material, linings being tamped by machine.

The 80% nickel-copper matte from the converters is shipped to the Orford Copper Co., New Brighton, N. Y., where it is smelted with sodium sulphite, effecting the separation of the combined nickel and copper, and the resultant copper product is refined electrolytically.

The smelter power plant, in a 101x158′ building, includes a complete steam plant, held in reserve for emergencies, but regular operation is by electric power throughout. The power plant includes 3 Nordberg radial-valve blowing engines, rope-driven by induction motors arranged to work at 3 speeds, to give full control of volume of air for the furnaces. The converter

blast is furnished by a Nordberg air-compressor with capacity of 12,600 c
feet of free air per minute, reduced to 12 pounds pressure.

A separate refining plant, built on the site of the old Orford refi
works, treats cobalt-silver-nickel-arsenic ores from the mines of the Co
district, producing speiss containing cobalt, nickel and silver, which is sen
the Orford works for parting and refining.

Production, 1905, was 4,743 short tons of nickel, a decrease of 2,255 t
from 1903, and 4,326,000 lbs. fine copper, as against 8,010,000 lbs. fine cop
in 1903. Production was materially larger, 1906-1907, and the normal capac
of the company, beginning 1909, may be rated at about 20,000,000 lbs.
copper and 40,000,000 lbs. nickel yearly. The new plant of the Canad
Copper Co. is one of the best planned and most complete in existence, and
management of the company is excellent.

CANADIAN MINING & DEVELOPMENT CO. **MONTA**

Dead. Formerly at Basin, Jefferson Co., Mont.

CANADIAN SMELTING & REFINING CO., LTD. **ONTAR**

Office: care of Frank Arnoldi, president, Toronto, Ont. Works offi
Sault Ste. Marie, Algoma, Ont. G. W. Monk, vice-president; E. Douglas W
ren, secretary and treasurer; Otto Stahlmann, manager. Organized under la
of Ontario, with capitalization $2,500,000, shares $1 par. Plans erecting
125-ton smelter to treat copper and nickel ores.

CANADIAN SMELTING WORKS. **BRITISH COLUMBI**

Owned by Consolidated Mining & Smelting Co. of Canada, Ltd.

CANANEA-ARIZONA CONSOLIDATED COPPER CO. **ARIZONA & MEXIC**

Office: 1511 First National Bank Bldg., Chicago, Ills. Letters returned u
claimed from former mine offices, Globe, Gila Co., Ariz., and La Canane
Arizpe, Sonora, Mex. S. W. Osgood, president; Chas. E. Noble, vice-presiden
Jas. W. Luther, secretary; preceding officers, Arthur T. Sexton, O. M. Co
John F. Donovan, F. Silverstein, J. Leathead and Jas. Jay Sheridan, directo
Organized 1907, under laws of Arizona, with capitalization $2,500,000, shar
$5 par. Lands include the Bisbee Extension mine, area 37 acres, near t
Greene Cananea; circa 100 acres in the Sierra Manzanal, southeast of
Cananea, and the Copper Basin group, near the Black Hawk mine of t
Arizona Commercial, at Globe. Idle and apparently moribund.

CANANEA-BISBEE DEVELOPMENT CO. **MEXIC**

Office: care of Hayden, Stone & Co., 87 Milk St., Boston, Mass. Mi
office: La Cananea, Arizpe, Sonora, Mex. P. J. T. Haney, president and g
eral manager; C. E. Watson, superintendent. Organized Dec. 21, 1906, un
laws of Maine, with capitalization $300,000. Was promoted by W. B. Thom
son. The Cananea property, supposed to carry the extension of the Mass
ore body of the Greene-Cananea, has 3 shafts. Lands at Bisbee, having
shafts, deepest 165', each showing ore of about 2% copper tenor, were s
rendered, late 1907, and apparently Cananea lands have been thrown up al
Idle and apparently moribund.

CANANEA CENTRAL COPPER CO. **MEXIC**

Office: Lyceum Bldg., Duluth, Minn. Mine office: La Cananea, Ariz
Sonora, Mex. Capt. Jas. Hoatson, president; Chas. A. Duncan, first vi
president and treasurer; G. Ashley Tomlinson, second vice-president; prec
ing officers, Thos. F. Cole, Chester A. Congdon, Wm. J. Olcott, Jos. B. Cott
John D. Ryan and Col. Wm. C. Greene, directors; Dr. L. D. Ricketts, gene
manager; Frederic R. Kennedy, secretary; Danl. R. Smith, assistant secretar
Wm. G. Hegardt, assistant treasurer. Organized Aug. 6, 1906, under laws
Minnesota, with capitalization $10,000,000, shares $10 par; issued, $6,000,0

The Cananea Central Copper Co. owns the entire capital stock of the San Pedro Copper Co., S. A., organized under laws of Mexico, which holds claims as follows: American, Copper Belt, Bryan, Seguro, Square, eastern part of Massey No. 2, and El Oriente.

The Cananea Central Copper Co. owns 268,120 shares of the issued capital stock of the Cananea-Duluth Copper Co., which has an issued capitalization of 269,186 shares, leaving only 1,066 shares outstanding, and it is probable that the Cananea-Duluth Copper Co. will be wound up as soon as the small balance of stock outstanding can be secured, and its property absorbed by the Cananea Central. It is said that the Cananea Central paid $450,000 for the Cananea-Duluth.

The Cananea-Duluth Copper Co. owns the entire capital stock of the Cananea Development Co., S. A., a Mexican corporation owning Los Dos Naciones claim, at Cananea.

Financial statement of the Cananea Central, of date Dec. 31, 1907, showed cash on hand, $61,882.10, with loans of $619,267.52 to the Greene-Cananea Copper Co., Cananea Consolidated Copper Co., S. A., Cananea-Duluth Copper Co. and San Pedro Copper Co., S. A. Liabilities included bills payable of $102,267.52.

Lands are 3,708 acres, including the holdings of subsidiary companies. Col. Wm. C. Greene turned over a large portion of this land to the Cananea Central, the lands from Col. Greene including properties granted the Sonora Copper Co., S. A., on May 4, 1904, which concessions were allowed to expire May 17, 1906. The land was denounced immediately thereafter by Col. Greene, personally, and turned over to the new company, presumably for the benefit of the Cananea Consolidated, in exchange for $2,000,000 stock in the Cananea Central, which was said to have been given, October, 1906, to the Greene Consolidated.

Litigation relative to stock in the Cananea Central, between Messrs. Thos. F. Cole, Col. Wm. C. Greene, Col. Epes Randolph and Lycurgus Lindsay, was settled, late 1907.

The Cananea Central Copper Co. is controlled, through the ownership of about 90% of the total stock issue, by the Greene-Cananea Copper Co., and, owing to the fact that the properties of the Cananea Central and its subsidiary corporations are operated as a portion of the Greene-Cananea, the mines are listed and described under the title of Greene-Cananea Copper Co.

CANANEA CONSOLIDATED COPPER CO., S. A. MEXICO.

Office and mine: La Cananea, Arizpe, Sonora, Mex. Thos. F. Cole, president; Dr. L. D. Ricketts, general manager; E. J. Campbell, treasurer; Chas. A. Duncan, assistant treasurer. Organized Sept. 30, 1899, under laws of Mexico, with capitalization 20,000 pesos, shares 100 pesos par. Entire stock issue is owned by the Greene Consolidated Copper Co., the Cananea Consolidated merely being the operating company having direct title to the lands of the Greene Consolidated. Is operated as a close corporation and gives out no information. Mines and smelters of this company, formerly described under title of Greene Consolidated Copper Co., are described, in this volume, under title of Greene-Cananea Copper Co., the operating company that is in control of the Greene Consolidated.

Although the Cananea Consolidated is supposed to be merely the operating company, and the Greene Consolidated was supposed to own the entire stock issue of the Cananea Consolidated, there seems to have been either a lax system of bookkeeping, or else a juggling of accounts between the Cananea Consolidated and the Greene Consolidated, as 200,000 shares of Cananea Central stock, supposed to have been turned over to the Greene Consolidated, ap-

parently never was owned by the Greene Consolidated, but belonged to Cananea Consolidated. This stock, if sold at $20 per share, as publicly asserted, would have placed $4,000,000 cash in the treasury of the Cananea Consolidated. The 200,000 shares of stock in question was preferred, being issued fully paid, the balance of stock being issued $5 paid and subject to $5 assessments. The 200,000 shares of stock in question was taken over by the putative owner by Messrs. Thos. F. Cole, John D. Ryan, Col. Wm. Greene, Henry H. Rogers, Wm. G. Rockefeller and Cleveland H. Dodge as individuals, presumably at the stated price of $20 per share.

The 51% of stock of the Sierra Madre Land & Lumber Co., given, as an asset of the Greene Consolidated, never was opened by the Greene Consolidated, but was owned by the Cananea Consolidated, which sold the stock back to Col. Greene, who apparently was unable to pay for it. The sale price was secured by 75% of the stock of the Sierra Madre company, which apparently has been forfeited by reason of non-payment of notes to the Cananea Consolidated or Greene Consolidated, by Col. Greene, hence apparently the Cananea Consolidated or Greene Consolidated now holds 75% of the stock of the Sierra Madre Land & Lumber Co., which has very extensive tracts of valuable timber lands in northern Mexico, with several sawmills.

The Cananea Consolidated Copper Co., S. A., has authorized bonds at the rate of $10,000 per kilometer at 6% for a 52-kilometer railroad, to be secured by a 20-year first mortgage on the railroad, principal and interest being guaranteed by the Greene Consolidated.

Col. Wm. C. Greene turned over about 4,000 acres of mineral land to the Cananea Central, which originally was part of the concessions granted to Sonora Copper Co., S. A., in 1904, allowed to lapse May 17, 1906, and immediately thereafter denounced by Col. Greene privately, and turned over to the Cananea Central, presumably for the benefit of the Cananea Consolidated in exchange for $2,000,000 stock in the Cananea Central.

The mines and works of the Cananea Consolidated are described under title of the Greene-Cananea Copper Co., in connection with the properties of the Cananea Central Copper Co.

CANANEA DEVELOPMENT CO. MEXICO

Mine office: La Cananea, Arizpe, Sonora, Mex. Is a subsidiary corporation of the Cananea Central Copper Co.

CANANEA & DULUTH DEVELOPMENT CO. MEXICO

Dead. Succeeded, circa 1906, by Cananea-Duluth Mining Co. Formed at La Cananea, Arizpe, Sonora, Mex.

CANANEA-DULUTH MINING CO. MEXICO

Office: Hibbing, Minn. Mine office: La Cananea, Arizpe, Sonora, Mex. Geo. McMillan, president; Walter J. Power, vice-president and general manager; S. L. Proctor, treasurer. Capitalization $500,000, shares $1 par. Controlled by the Cananea-Central Copper Co., which owns $208,128 stock out of issued capital of $209,206. Company probably will be wound up as soon as small balance of stock outstanding can be retired, and property described under title of Greene Cananea Copper Co.

CANANEA-EASTERN MINING CO. MEXICO

Office and mine: La Cananea, Arizpe, Sonora, Mex. J. J. Williams, president; E. P. Draper, secretary; M. J. Thomas, treasurer; N. J. Nash, superintendent. Organized Sept. 9, 1904, under laws of Arizona, with capitalization $1,000,000, shares $1 par. Lands were 149 pertenencias in 2 groups, but 52 hectares, in the Ajo Mountains, were sold, 1907, to the Fay-Cananea Mining Co., payment being in stock of latter. Apparently the Cananea-Eastern

some lands remaining, as in May, 1908, it was planned to do some diamond drilling on copper claims in the Ajos.

CANANEA & GLOBE EXPLORATION & DEVELOPMENT CO. **ARIZONA & MEXICO.**

Office: 522 Bradbury Bldg., Los Angeles, Cal. Mine offices: Globe, Gila Co., Ariz., and Baca Bldg., La Cananea, Arizpe, Sonora, Mex. Robt. Mitchell, president and general manager; Henry J. Stevens, vice-president; Geo. A. Fitch, secretary; J. C. Britt, superintendent. Capitalization $15,000,000. Is controlled by Geo. Mitchell. The Five Points Copper Mining Co., controlled by stock ownership, holds the Globe lands, which include the Clark, Lockwood and Van Wagnen groups, 34 claims, near the Gibson Copper Co. at the head of Pinto Creek, 14 miles west of Globe. Company also holds the Peabody group of 5 claims, near the Superior mine, at Superior, Pinal county, Arizona. Also has lands in the Cananea district, and is said to have purchased the South Cananea tract. The Superior property has a 3-compartment shaft, claimed to be 665′ deep, which seems doubtful, and is stated to be in rich ore and to be driving a tunnel to connect with shaft. Begun grading, 1906, for a 200-ton smelter, on the North Dominion property, 2 miles north of Globe, but did not get beyond the grading stage. Apparently moribund.

CANANEA MANZANAL MINING CO. **MEXICO.**

Mine office: La Cananea, Arizpe, Sonora, Mex. Organized circa July, 1907, under laws of Arizona, with capitalization $1,000,000, by W. J. Downing and S. H. Yeager.

CANANEA MIDLAND COPPER CO. **MEXICO.**

Office: Tucson, Ariz. Letter returned unclaimed from former mine office, La Cananea, Arizpe, Sonora, Mex. Chas. M. Shannon, president and general manager; M. P. Wright, vice-president; Frank J. O'Brien, secretary and treasurer; preceding officers, Geo. Gruning, F. O. Havener, Alfredo May and L. J. Laeger, directors. Organized January, 1907, under laws of Arizona, with capitalization $2,000,000, shares $10 par; issued, $120,000. Lands, 230 acres, said to be near the Cananea Central. Idle since organization, but company plans raising funds by stock sales and beginning development.

CANANEA NORTHERN MINING & DEVELOPMENT CO. **MEXICO.**

Office: care of Guy Neely, Bisbee, Ariz. Letter returned unclaimed from former mine office, La Cananea, Arizpe, Sonora, Mex. Organized 1907, and is operated as a close corporation. Lands, circa 500 acres, north and northwest of the Bonanza de Cobre mine.

CANANEA NUEVA MINING CO. **MEXICO.**

Letter returned unclaimed from former mine office, La Cananea, Arizpe, Sonora, Mex. Marshall P. Wright, president. Is said to be controlled by the Lewisohn interests. Lands, circa 1,200 hectares, about 2 miles northwest of the Puertecitos mines of the Greene-Cananea, on the line of the Cananea road to Imuris, having 5 shafts, deepest 112′, showing ore from depth of about 40′, giving average assays of about 17% copper. Suspended operations May, 1908.

CANANEA ORE CO. **MEXICO.**

Office: 1206-24 Broad St., New York, N. Y. Mine office: La Cananea, Arizpe, Sonora, Mex. Organized March 22, 1906, under laws of Maine.

CANANEA-PITTSBURG MINE. **MEXICO.**

Letter returned unclaimed from former mine office, La Cananea, Arizpe, Sonora, Mex. E. M. DeMaine, manager. Lands are in the vicinity of the Five Cananeas, in the Sierra Azul, east of La Cananea.

CANANEA-SONORA DEVELOPMENT CO. **MEXICO.**

Mine office: La Cananea, Arizpe, Sonora, Mex. J. E. Thon[illegible] presi-

dent. Organized circa 1907, with capitalization $500,000. Lands are su
claims in the Sierra Manazanal, to the southeastward of La Cananea.

CANANEA WESTERN COPPER CO. MEX

Mine office: La Cananea, Arizpe, Sonora, Mex. J. T. Wilkie, ge
manager; preceding officer, M. McDonald; Donald Gillis, T. Pittman, J
Martin and J. T. Wilkie, directors. Capitalization, $3,000,000. Suppos
controlled by Chas. Schwab. Lands, 398 hectares, 7 miles west of La Can
slightly developed, showing promising ore indications.

CANANEA WEST MINING CO. MEX

Dead. Succeeded circa April, 1907, by Cananea Western Copper
Formerly at La Cananea, Arizpe, Sonora, Mex.

CANAS MINES, LTD. MEX

Office: 33 Eldon Street House, London, E. C., Eng. Mine office: Z
pán, Hidalgo, Mex. Sir J. Rivett-Carnac, Bart., chairman; F. H. Baxter, s
tary and treasurer. Organized Dec. 23, 1896, under laws of Great Bri
with capitalization £75,000, shares £1 par; issued, £66,607. Lands, sundry s
and copper claims, area 66 acres, circa 15 miles from Zimapán, bought
£65,000 in shares from the Mines Contract Co., Ltd. Presumably idle.

CANBELEGO COPPER MINING CO., LTD. AUSTRA

Office: Cobar, N. S. W., Australia. Mine office: Canbelego, Canb
Co., N. S. W., Australia. Lands carry considerable standing timber, avai
for fuel and mining use. Property has 2 parallel veins, with aggregate w
of about 40′, showing stretches of good ground, succeeded by poor pat
To Apr. 1, 1908, had shipped 76 long tons of ore, yielding 17 long tons
copper.

CANBELEGO NORTH COPPER MINING CO. AUSTRA

Mine office: Canbelego, Canbelego Co., N. S. W., Australia. Pro
adjoins the Canbelego Queen.

CANBELEGO QUEEN CO., LTD. AUSTRA

Dead. Liquidated October, 1907. Lands were 60 acres, adjoining
Canbelego North. Formerly at Canbelego, Canbelego Co., N. S. W., Aust

CANDELARIA MINING & EXPLORATION CO. MEX

Dead. Lands sold to Mexican Standard Mining Co. Formerly at Hi
del Parral, Chihuahua, Mex. Described Vol. V.

CANTON MINE. GEOR

Mine office: Pierceville, Fannin Co., Ga. Has micaceous schist, im
nated with chalcopyrite. Idle for many years.

CANTON MINING CO. NEV

Dead. Was succeeded by McKinley Mining & Smelting Co., which
succeeded by McKinley Consolidated Mines Co., which was succeede
Willard-Ely Copper Co., which was succeeded by Consolidated Copper Co
history of the property thus constituting a notable series of successes.
merly at Ely, White Pine Co., Nev.

CANYON COPPER CO. ARIZ

Office and mine: Grandview, Coconino Co., Ariz. Jno. H. Page,
dent and general manager; H. H. Smith, secretary and treasurer; John C
mine superintendent. Organized 1902, under laws of Arizona, with capit
tion $600,000, shares $10 par, buying lands of Last Chance Mining Co. L
10 claims, area 200 acres, also a 10-acre millsite, in the Grand Cañon o
Colorado river. Has contact deposits between limestone and porphyry,
to give average assays of circa 30% copper, from cuprite, melaconite,
achite, azurite and chalcopyrite. In 1904 produced circa 350,000 lbs. fine co
and in 1906 made 26,798 lbs. fine copper and 324 oz. silver. Property
sidered promising. Suspended operations October, 1907.

CANYON GOLD & COPPER CO. **MONTANA.**

Office: Helena, Mont. Letter returned unclaimed from former mine office, Canyon Ferry, Lewis & Clark Co., Mont. Canoll & Martin, managers; A. W. Martin, superintendent. Property has been a small shipper of smelting ore, averaging about 22% copper, with fair gold values. Idle several years.

CANYON MINING CO. **ARIZONA.**

Mine office: Mayer, Yavapai Co., Ariz. Organized, circa 1905, as successor of the Black Canyon Copper Co., Ltd., which failed. Presumably idle.

MINA CANZA. **PERÚ.**

Office and mine: care of A. Garland y Ca., owners, Canza, Ica, Perú. Is an old property, once a considerable producer. Numerous cupriferous veins, in igneous rocks, carry bodies of ore that are oxides and carbonates above and sulphides below, 3 principal veins being opened to depths of 700′ on the Adelaide, 1,000′ on the Consolador, and 500′ on the Tapadita, the latter mine having been the largest producer in the past. Idle.

SOCIETA DELLE CAPANNE VECCHIE e POGGIO BINDO. **ITALY.**

Dead. Formerly at Massa Marittima, Grosseto, Tuscany, Italy. Mine now owned by Societa Anonima delle Miniere de Montecatini.

CAPE BRETON COPPER CO., LTD. **NOVA SCOTIA.**

Office: 308-53 State St., Boston, Mass. Mine office: Coxheath, Cape Breton Co., N. S. John C. Watson, president; Isaac P. Gragg, secretary; J. Dorr, treasurer. Capitalization $2,000,000. Property is the old Coxheath mine and adjoining lands, 10 miles from Sidney, Cape Breton, showing several cupriferous veins, of which the principal, averaging 10′ width, traverses felsite and diorite, carrying argentiferous and auriferous chalcopyrite, in a silicious gangue, ore averaging about 4.5% copper. Deepest shaft, 420′. Idle for some years.

CAPE BRETON PROSPECTING, MINING & DEVELOPMENT CO. **NOVA SCOTIA.**

Office: Sidney, N. S. Mine office: Inverness, Cape Breton Co., N. S. F. W. Morley, president; W. F. Dennison, vice-president; A. N. McLennan, secretary and treasurer; preceding officers, C. V. Wetmore, Dr. A. McLennan, Dr. C. E. McMullen and Hon. D. McNeil, directors; H. N. Borden, mine superintendent. Organized under laws of Nova Scotia, with capitalization $500,000, shares $1 par. Property is sundry mineral lands, including the Scottsville mine, which shows copper ore. Presumably idle.

CAPE COPPER CO., LTD. **CAPE COLONY & NEWFOUNDLAND.**

Office: 9 Queen Place, London, E. C., Eng. Mine office: O'okiep, Little Namaqualand, Cape Colony. Works office: Briton Ferry, Glamorganshire, Wales. Edmund A. Pontifex, chairman; preceding officer, T. Russel Kent, John E. Champney, John Taylor and T. Blair Reynolds, directors; John Taylor & Sons, managers; Percy John Frank, secretary. Organized Apr. 30, 1888, under laws of Great Britain, as a reconstruction of the Cape Copper Co., Ltd., organized 1863, with capitalization of £750,000, in £150,000 cumulative 6% preference shares, par £2, and £600,000 ordinary shares, par £2; issued, £780,000. Dividends have been as follows: 13s. in 1901; 5s. in 1903; 8s. 6d. in 1904; 9s. in 1905; 13s. in 1906; 19s. in 1907; 16s. 6d. in 1908. Annual accounts are made up to April 30th at the Cape, and to August 31st in London, and are submitted in December. Separate accounts are kept for the Tilt Cove mine. Profits for fiscal year 1907 were £343,384, a gain of £79,822.

The Tilt Cove mine in Newfoundland is held on a 99-year lease, expiring 1989, at an annual rental of £4,400, plus one-half of net profits. The Tilt Cove is separately described under title of its owner, the Tilt Cove Copper Co.,

Ltd. Net profits of the Tilt Cove mine, 1906, were £99,340 7s. 10d., di- equally between the Cape Copper Co., Ltd., and the Tilt Cove Copper Co.,

The company has 3 properties under option in America, and one in L on all of which exploratory work is in progress.

The Cape Copper, Co., Ltd. is entitled to one-half the net profits o Briton Ferry Chemical & Manure Co., Ltd., which takes the sulphur f given off by the company's works at Briton Ferry, profits from this so 1906, having been £1,299.

The company has 4 producing mines and 3 mines under developmen addition to various idle mines and prospects, in the vicinity of O'okiep, older including the O'okiep and Spektakel mines, opened 1852. Ores mainly chalcopyrite, with limited quantities of bornite and chalcocite, mately associated with pyrite, showing occasional cuprite and malaco with a little malachite, azurite and chrysocolla near surface. The ore bo are irregular, massive deposits of pyritic ore, associated with basic igu intrusives in granite and gneiss.

The O'okiep, long the principal producer, has dwindling ore rese estimated, 1907, at 12,000 long tons of 20% ore, and, in 1907, produced 1 long tons of ore of 17.4% copper tenor, a decrease of 3,204 tons. The O'o East mine shows a limited amount of low grade ore.

The Nababeep mine, opened 1890, includes the Nababeep South, now company's principal producer, in 1907 yielding 51,507 tons of 4.7% ore against 53,151 tons of ore of the same tenor in 1906. Reserves are estim at 180,000 long tons of ore, of 50% copper tenor. The Nababeep North min nearly worked out, yielding, 1907, only 2,092 long tons of ore, of 5. average tenor. Several trial shafts have been sunk in the neighborhood of Nababeep South, 2 showing copper bearing ground, but no important ore b has been developed.

The Narrap mine is a new property, under development, which, in 1 yielded 1,238 tons of 4% ore. The property is developing fairly, show reserves of about 25,000 long tons of ore of 4 to 5% tenor. An aerial t is being installed, to connect the Narrap with the smelting works.

The Spektakel is an old mine, opened 1852, which has been idle for s years. Its ore bodies occur in both the granite and basic intrusive rocks.

Miscellaneous properties include the Kopperberg mine, which is idle, Coetzee mine, which has been abandoned and plant removed to the Flat m 4 miles north of Nababeep, which is being reopened; the Carolusberg I mine, and the Springbok mine. On the whole the prospects of opening h new mines in the vicinity of O'okiep do not seem especially reassuring.

The machinery plant at the O'okiep mine has been electrified, the steam plant being held in reserve for emergencies.

In addition to a tram-line connecting the smelter with the principal mi the company owns a 100-mile railway, running from O'okiep to Port Noll where there are docks, wharves, cranes, tugs and lighters for the rec and dispatch of freight. Local traffic of the railroad, 1907, was 94,988 tons. Negotiations are under way for the sale of this railway to the gov ment of Cape Colony.

The reduction works at the mines include small smelters at O'okiep Nababeep. Two blast-furnaces at the O'okiep works were rebuilt, 1907, the Nababeep furnaces were rebuilt 1908. Production of the local smelters matte of about 48 to 50% copper tenor, shipped to the Briton Ferry works refining.

The Briton Ferry smelter, which is the largest in Wales, in addition treating the company's own ores does a general custom business, smelting

f the Namaqua Copper Co., Ltd., under contract, in 1906, treating long tons of Namaqua ore and 883 tons of Namaqua matte of 54% tenor. The Briton Ferry works are located on the Great Western and ds railways, also having canal connection with Swansea, receiving ores by rail. The works have revolving cylindrical calciners up to 80′ in heated by gas, and four 70-ton blast-furnaces, making matte. Ores are l, without calcining, in reverberatories, to a 76% white metal, which is by the Nicholls direct method, by which some of the white metal is d and mixed with uncalcined white metal, the consequent reaction ting the remaining sulphur. Tilt Cove sulphide ores are burned in or their sulphur contents, fumes going to an acid plant, which makes 0,000 tons of chamber acid yearly. The works have a double concentric y of steel and concrete, and a telpherage plant for handling material. the Briton Ferry works produced the equivalent of 10,212 long tons of per, of which 733 tons were turned out as bluestone.

duction of fine copper, for calendar year 1905, was 16,358,720 lbs. The pper Co., Ltd., is an old producer, with an honorable record, and it is to d that the company may succeed in its efforts to locate and develop l profitable mines, to replace its waning properties in South Africa.

D'OR COPPER DEVELOPMENT CO. **NOVA SCOTIA.**

e office: Cape d'Or, Cumberland county, Nova Scotia. Long idle.

NOME COPPER MINING CO. **MONTANA.**

ce: 328 Dixon Block, Missoula, Mont. Mine office: Clinton, Mis-, Mont. F. C. Webster, president; F. H. Woody, vice-president; H. T. on, secretary, treasurer and general manager; Ole Ericson, superin ; preceding officers and A. L. Coffey, directors. Organized November, nder laws of Montana, with capitalization $1,000,000, shares $1 par; 893,600. Annual meeting, first Monday in June.

nds, 3 claims, patented, area 40 acres, in the Clinton district, showing veins in granite, of which 3 are under development, one, of 8′ average traceable 800′, being opened by 4 crosscut tunnels, longest 340′, and by ls of 75′, 850′, 500′, and 450′, and shafts of 40′, 70′, and 500′, with f workings. Company plans crosscutting for ore on the 500′ level. ent includes a 120-h. p. steam plant with a 40-h. p. Lidgerwood hoist 12-drill Ingersoll air-compressor. There are 6 buildings, including a machine shop and 2 small smithies. Property considered promising.

LITAS COPPER CO., LTD. **ARGENTINA.**

ice: 6 Princes St., London, E. C., Eng. Mine office: Cerro de Cap- Tucumán, Argentina. Works office: Muschaca Quebrada, Catamarca, na. Geo. Grinnell-Milne, chairman; J. G. Tait, secretary; D'Arcy rbee, general manager; T. Beckett, mine superintendent; C. H. Jones, rgist; R. Underhill, engineer. Organized Nov. 25, 1901, under Great Britain, with capitalization £670,000, shares £1 par; issued), in £150,000 cumulative 7% preference shares, £150,000 cumulative y shares, and £300,000 deferred shares. Accounts for year ending Jan , showed total expenditures to date of £47,867, after deducting £ ceipts of production.

ds are extensive, including the Capillitas and Atajo groups of Pilciao and Constancia smelters, bought for £95,000, also mis airly timbered. The Capillitas group, of about 20 properti of Andalgalá, in the eastern part of Catamarca, shows 15 velopment by former owners having been on the Restaura a, La Grande and Ortiz mines, reopened, under pres nnels under the old workings of La Grande, and

the Restauradora. The Atajo mines are 6 miles northwest of the Capi group. Company claimed ore from development work averaged about copper, with good gold and silver values, but the smelter returned an ave of only 7% copper, 8 oz. silver and 0.7 oz. gold per long ton. These m have been worked, spasmodically, by local capital, since circa 1850. Restauradora mine has upwards of 3 miles of workings, with a vein of 18" width, ore occurring irregularly, in chutes, being chalcopyrite, associated pyrite, containing considerable chalcocite and bornite.

Property is located in an extremely rugged mountain country, necess ing former shipment of ore to smelters by pack-mules, mines being 8, above sea-level, and more than 6,000' above the temporary works at Pile Nearest railroad station is Chumbicha, 165 kilometers distant, over exc ingly rough and dusty roads, on which a traction engine was tried, but st in the sand. The Argentine government promised, years ago, to extend Córdoba Central railroad to Andalgalá, but the line failed to materialize. cover the worst stretch between the mines and smelters, a single line ae tram was ordered, from Bullivant & Co. The line is 22 miles in length, w longest span of 2,765' and highest span of 625'. Plant weighs circa 2,000 to and was designed to carry 40 tons of ore hourly, at a speed of 2.5 meters second, with buckets of 500 kgs. capacity. The tramway was started Apr. 1907, after almost interminable delays in delivery of material, but did succeed in filling the 600-ton bins at the smelter until May, when one blast furnace was blown in, beginning semi-pyritic smelting, with 5% charco charges, but experiencing unusual difficulties. Much trouble was had with th tram-line from buckets falling off. Experts from the designers were sent to Argentina, but failed to remedy the trouble. Instead of a rated capacity of 150 tons daily, the maximum quantity of ore transported in one day was 50 tons, and the average, for several months, was about 15 tons daily. The tram-line leaves a 20-mile gap between Pilciao and Muschaca, over which transportation is by carts.

The smelter has two 50-ton water-jacket blast-furnaces, with dam, filter and tanks, water being supplied through an 8½-kilometer pipe-line. The old Constancia smelter has 2 reverberatory furnaces. The new smelter gave much trouble in operation, but was amply capable of caring for all ore the tramway could bring. First-fusion product was a 30% matte, resmelted to 50% copper tenor, which was packed and carted 120 miles, over a desert, to the nearest railroad station. Production, 1907, was circa 350 tons of 50% matte, equal to circa 400,000 lbs. fine copper, secured with a force of 125 men at the mine and 50 at the works. At the end of 1907 company claimed to have reserves of 58,000 long tons of ore, estimated at 8.5% copper tenor, though Mr. Wetherbee had advised previously closing down the property, by reason of the small amount of ore in sight, and poor transportation facilities. The board refused to act on Mr. Wetherbee's advice, and ordered a continuation of the work, but by the end of 1907 all good ore in sight had been gouged out, and, lacking funds to continue systematic development, work was suspended and machinery packed at the end of 1907, permission to close for 2 years, pending the completion of the promised railroad, having been obtained from the Argentine government. French shareholders were disgusted, with good reason, and sent a committee to investigate.

Given adequate transportation facilities, sufficient mine development and a modern smelting plant, the Capillitas properties might be made profitable, but, as matters stand, the property is practically worthless. The management made large promises, none of which were redeemed, and has boggled its work, making a lamentable mess of the job. Bankruptcy apparently is inevitable.

APITOL CONSOLIDATED MINING CO. **MONTANA.**
Letter returned from former mine office, Helena, Lewis & Clark Co., Mont. ...ms, 4 miles south of Helena, known as the Copper Chief group, show a ... vein giving assays up to 14% copper, 35% lead, 175 oz. silver and $7 gold ... ton.

...P SHEAF COPPER & GOLD CO. **BRITISH COLUMBIA.**
Dead. Formerly at Van Anda, Texada Island, B. C.

...RACAHUI MOUNTAIN COPPER CO., LTD. **MEXICO.**
Office: Kansas City, Mo. Mine office: Llano, Magdalena, Sonora, Mex. ...ds, 50 hectares, circa 10 miles south of Llano, between the Calumet & ...ora and Sonora Copper Co., showing 8 parallel veins, in a cross-section of ...a 250', with about 500' of workings, showing cuprite, malachite and ...locite.

...AS DE COBRE DE CARAHYBA. **BRAZIL.**
Mine office: Praba Jaguarary, Bahia, Brazil. Dr. José Gonçalves da Silva, ...er. Mine, on the São Francisco river, was opened in 1783, and is perhaps ...most important copper mine of Brazil. Pits and shafts of 1 to 28 meters ...h show copper oxides. Ores apparently are distributed over a large extent ...rritory, but depth reached has been insufficient to determine the extent of ...xidized zone or the nature of the ores below.

...A CARAMBOLA. **MEXICO.**
...ffice and mine: care of D. Pablo Palacio, owner, Indé, Durango, Mex. ...s, 18 pertenencias, in two groups, opened by La Chusa shaft, 15 metres, ...ng a 10' vein of auriferous coper ore, carrying 4 to 30% copper and 30 ...lver per ton. Average assay values range from 3.5% copper and 300 ... silver, in the argentiferous ore, to 14.5% copper and 100 oz. silver in the ...opper ore. Early in 1906 was shipping 20 to 30 tons of ore daily.

...ON COUNTY GOLD MINING & MILLING CO. **WYOMING.**
...ine office: Morgan, Carbon Co., Wyo. Ores carry gold, silver, lead and ... Has steam power and a 10-stamp mill. Presumably idle.

...EÑAS COPPER CO. **ARIZONA.**
...d. Absorbed, circa 1903, by Anita Consolidated Copper Co. Formerly ...iams, Coconino Co., Ariz.

... CARDENILLO y ARMADILLO. **MEXICO.**
...ne office: Túxpam, Santiago Ixcuintla, Tepic, Mex. Fernando Diaz, ... A. C. Gonzales, manager. Mines have silver-copper ores, with steam ...employing circa 50 men, at last accounts.

...FF MINING & MILLING CO. **UTAH.**
...ice: care of Hugh A. McMillan, secretary and treasurer, Salt Lake ...tah. Mine office: Alta, Salt Lake Co., Utah. Fred W. Price, presi... ...d general manager. Organized 1906, under laws of Utah, with capi... ...on $50,000, shares $1 par. Property is the Mountain Chief group, near ...umbus Consolidated, on the divide between the Big Cottonwood and ...Cottonwood districts. Mine has a 270' shaft, showing a fair ore body, ... shipped some ore to Salt Lake smelter ranging up to 2% copper, 3% ...d 65 oz. silver per ton, with a little gold.

...BEAN MINING CO. **COLORADO.**
...ice: Holyoke, Mass. Mine office: Ophir, San Miguel Co., Colo. Ores ...old, silver, lead and copper. Has water power and a 20-stamp mill. ...ably idle.

...OU GOLD & COPPER CO. **IDAHO.**
...ice: care of Frank A. Putnam, Gray, Idaho. Organized September, ...ith capitalization $2,500,000, shares $10 par, to develop claims 65 miles

southeast of Idaho Falls, in Bingham county, Idaho, said to have an 8′ ve traceable 3,000′. Idle for some years and apparently moribund.

COMPAÑIA MINERA CARIDAD y ANEXAS. MEXI

Office: care of Adolph Marx, president, Mexico, D. F. Mine offi Guachinango, Mascota, Jalisco, Mex. Otto Vorath, manager. Capitalizati 200,000 pesos. Lands, 180 hectares, on the Rancho Pánuco, showing hig argentiferous and auriferous copper ores. Made small shipments, 1907, Aguascalientes smelter.

CARIDAD COPPER MINING CO., LTD. SPAI

Office: 20 Lawrence Lane, Gresham St., London, E. C., Eng. Mine offi Lozoyuela, Madrid, Spain. Robert Summerside Simpson, chairman; G Thompson, secretary. Organized Feb. 15, 1899, under laws of Great Brita and capitalization increased, 1901, to £350,000, shares £1 par; issued, £75,4 Lands, 325 acres, including the Caridad, San Antonio and Descuido min Idle some years.

MINA CARISA. MEXI

Office and mine: care of Carlos Blake, owner, Autlán, Jalisco, Mexi Lands, 30 pertenencias, circa 30 miles west of Autlán, showing a 30′ ve carrying auriferous and argentiferous chalcopyrite. Has about 400′ of op ings. Presumably idle.

CARISA COPPER & GOLD MINING CO. UTA

Dead. Succeded, 1907, by Carisa Gold & Copper Mining Co. of Mai Formerly at Mammoth, Juab Co., Utah. Described Vol. VI.

CARISA GOLD & COPPER MINING CO. OF MAINE. UTA

Office: 161 Main St., Salt Lake City, Utah. Mine office: Mammoth, J Co., Utah. Henry G. McMillan, president; Henry Newell, vice-preside E. B. Critchlow, secretary and treasurer; W. N. Roseberg, superintend Organized 1907, under laws of Maine, with capitalization $500,000, shares par, as successor of Carisa Gold & Copper Mining Co., which was organi 1901, under laws of Utah, with same capitalization. Old company le assessments of $30,000 and paid a $30,000 dividend, 1902. Lands, 8 pate claims, area 57 acres, adjoining the Centennial-Eureka, said to show 6 v as fissures in limestone and as contact veins between limestone and quart 3 of which, more or less developed, of 4′ average width, are said to average returns of circa 5% copper, 3 oz. silver and $2 gold per ton, f oxidized ores. Mine, as sampled by Newton A. Dunyon, gave average as of 4.51% copper, 3.54 oz. silver and 0.037 oz. gold per ton. Has shipped to smelter ranging up to 11% copper tenor. Some copper ore was found, 1 on the Spy side of the mine, and an effort is being made to locate the tinuation of the ore bodies from the adjoining Colorado mine. Estimat 80,000 tons of ore blocked out for stoping was an exaggeration, though siderable low grade concentrating ore is in sight. Mine is very pockety, carries occasional very rich pockets. Has 3 shafts, including the 350′ Cor shaft and the 800′ Spy shaft, also a 7,000′ tunnel with about 5 mile workings. Formerly was under the management of Hon. Harry S. Jos who did good development work. Stock was rigged unmercifully, early 1 when a 2-cent monthly dividend was promised by new management, but paid, and a 1-cent dividend, that was paid, apparently was disbursed sin to promote stock sales. Company's estimate of production of 1,200,000 fine copper for 1906 was grossly exaggerated. At last accounts property being operated in a small way, under the leasing system. Mine apparentl some value, but company not regarded favorably.

CARLISLE COPPER CO. MONTA

Dead. Formerly at Butte, Silver Bow Co., Montana.

ARMACK GOLD & COPPER MINING CO. **WASHINGTON.**

Letter returned unclaimed from former office, Arcade Bldg., Seattle, Wash. Mine office: North Bend, King Co., Wash. G. W. Carmack, president; L. O. Lane, secretary. Organized 1899, with capitalization $500,000, shares 25c par. Lands, 6 claims and a millsite, with good water power available for development, on the south fork of the Snoqualmie river, 22 miles northeast of North Bend. Has 375' of openings, showing veins of 12", 30" and 12', latter with a 2' to 3' paystreak, giving fair assay values in gold, silver, lead and copper. Idle.

CARMAN CONSOLIDATED COPPER CO. **MEXICO.**

Office: Hibbing, Minn. Operating office: Douglas, Ariz. Walter J. Power, president; John T. Casey, vice-president and general manager; J. F. Ross, secretary and treasurer; preceding officers, J. S. Martindale, C. B. Bell, Homer Prickett and F. S. Douglas, directors. Organized, circa 1906, with capitalization $500,000, shares $2.50 par. Holds title to lands through Compañia de Oro y Plata, S. A., organized under laws of Mexico. Lands, in northern Sonora, are 9 groups of 351 pertenencias, area 877 acres, adjoining Las Chispas mines, showing several strong veins, with 1,911' of workings. The Carmen and Don Placido groups have dumps carrying about 1,100 tons of ore, said to average 4.65% copper, 62.2 oz. silver and 0.21 oz. gold per ton. The Blanca Rosa group gives average assays of 16.8% copper, 77 oz. silver and 0.42 oz. gold per ton. The Maria group gives average assays of 3% copper, 107 oz. silver and 1.32 oz. gold per ton. Los Toros group gives average assays of 4.2% copper, 29% lead, 38 oz. silver and 0.03 oz. gold per ton. Various ore shipments to El Paso smelter have given returns ranging from $82.98 to $4,575.79 per ton. Property considered promising.

MINAS DEL CARMEN. **CHILE.**

Mine office: Pueblo Hundido, Chañaral, Atacama, Chile. Simon Baldivieso, owner; Adriano Fernandez, manager. Lands, 15 hectares, including El Carmen, Carmela, Cardúmen, Nuevo, Araucana, Quiñazo, Locura, Lautaro and other mines. Property shows 2 main veins in syenite, the Veta Manto ranging 4 to 12 meters in width, with a minor vein of 2 to 3 meters width, both having north and south strike, with dip of 40°. Ore occurs in lenticular chutes, the oxidized zone of 100 meters depth carrying oxides, carbonates and silicates, with an abundance of native copper at approximately 200' depth in the Carmen mine, with secondary sulphides at a vertical depth of circa 110 meters, followed by chalcopyrite, associated with arsenopyrite, disseminated in a gangue of iron oxide, limestone and decomposed porphyry.

El Carmen, the principal mine, is opened by 2 shafts, 190 meters apart, sunk at an angle of 45°, to depths of 85 meters and 250 meters, the vein ranging 2 to 12 meters wide, with an average width of 5 meters. The other mines are opened by shafts. The properties, as a whole, show reserves of about 75,000 tons of ore, of 5 to 15% copper tenor. Property has, in reserve, on dumps, about 7,000 metric tons of ore of 6 to 12% copper tenor, and about 30,000 metric tons of 5% ore.

Equipment includes a good steam plant, and forces are about 100 men. Ore is selected before smelting. Production, 1903, was circa 6,000 metric tons of ore of 12% ore, yielding circa 1,600,000 lbs. fine copper.

MINAS DEL CARMEN AMPLIACION. **MEXICO.**

Mine office: Cerralvo, Cuarto, Nuevo León, Mex. Marciano E. Villareal, owner and manager. Ores are argentiferous copper and lead sulphides. Presumably idle.

CARMEN COPPER CO. **MEXICO.**

Office: 52 Front St., New York, N. Y. Mine office: Mineral del Carmen, El Oro, Durango, Mex. H. Van Leer, general manager. Property is El Car-

men mine, carrying silver and copper ores. Has steam power and a mill o[f] metric tons daily capacity, employing about 150 men at last accounts.

CARMEN COPPER MINES, LTD. **CHILE & NEWFOUNDL[AND]**

Letter returned unclaimed from former office, St. George's House, [Can]cheap, London, E. C., Eng. Mine office: Cerro Blanco, Copiapó, Ata[cama] Chile. Alfred Hambley Rowe, chairman; John Pye, secretary. Orga[nized] June 28, 1900, under laws of Great Britain, with capitalization £125,000, s[hares] £1 par; issued, £75,307. Absorbed the Newfoundland Copper Co., Ltd., [in] thereby securing the Little Bay and Lady Pond copper mines, in Newfo[und]land, now idle. The Little Bay mine, operated 1878-1892, has a main shaf[t] 1,350′ and a small smelter, and was a small but steady copper producer, w[hen] worked, but has been idle several years.

Chilean property includes the Perseverancia mine, at Guanaco, Ta[rapacá] the Carmen Bajo, in the Copiapó district, and the Bella Vista, Aguardos [and] other mines, in Coquimbo. The Copiapó properties have been idle some ye[ars] and only light exploratory work has been done at the other mines. Appare[ntly] out of business.

GUILLERMO CARMONA. **CHI[LE]**

Office and mine: Higuera, La Serena, Coquimbo, Chile. Mines include [the] Estrella de Maria, San Tomás and Santiago. Production, 1903, was circa [2,5]00 metric tons of ore averaging about 10% copper tenor.

CARNARVON ASSOCIATED GOLD & COPPER MINES, LTD. **WALE[S]**

Office: care of Paddison, Trevor & de la Chapelle, 34 Gresham St., Londo[n] E. C., Eng. Organized Jan. 31, 1903, under laws of Guernsey, with capitaliz[a]tion £10,000, shares 10s. par. No business done. Moribund.

CARNATION MINING CO. **ARIZON[A]**

Mine office: Parker, Yuma Co., Ariz. Lands are in vicinity of Empir[e] Flats, on the Colorado River. Idle.

CARN BREA & TINCROFT MINES, LTD. **ENGLAND**

Office and mine: Carn Brea, R. S. O., Cornwall, Eng. Frank Harvey, J[r.] P., chairman; T. Forster Brown, consulting engineer; John Trevathan, secretary; Capt. J. Penhall, general manager. Organized May 24, 1900, under laws of Great Britain, with capitalization £150,000, shares £1 par; issued, £136,366. Property is tin and copper mines at Redruth and Illogan, Cornwall, formerly making nearly 1,000 tons of copper yearly, but present annual output averages about 50,000 lbs. fine copper only, tin being the principal product. Output, 1906, was 672 long tons of copper ore averaging 4% copper, equivalent to about 60,000 lbs. fine copper.

CARNEGIE COPPER CO. **VIRGINIA.**

Letter returned unclaimed from former office, Carnegie, Pa. Mine office: Red Oak, Charlotte Co., Va. Wm. H. McLain, superintendent. Has auriferous and argentiferous copper ores, slightly developed.

CARNEY COPPER CO. **IDAHO.**

Mine office: Mullan, Shoshone Co., Idaho. Jos. L. Martin, president; W. G. Greenough, secretary and treasurer; Joseph Carson, superintendent; preceding offices, C. D. Miller and Hans J. Rice, directors. Organized 1906, under laws of Idaho, with capitalization $1,500,000, shares $1 par. Lands, 11 claims, 3 fractional, well timbered, and a water-right, area circa 175 acres, on the north slope of Stevens Peak, about 4 miles from Mullan. Mine has 2 tunnels, No. 2 being 710′, also several open cuts and pits, showing ore of about 3% copper tenor. Jos. Carney, former owner of lands, has brought suit for $50,000 damages and annullment of deed, claiming that purchasers got him drunk and kept him drunk two months. If verdict rendered for plaintiff, court should allow a reasonable offset for value of whiskey consumed.

CARNEY COPPER CO. **MICHIGAN.**

Office: care of John O. Broden, president, Norway, Mich. Mine office: Carney, Menominee Co., Mich. Antoine Anheier, superintendent. Organized 1904, under laws of Michigan, with capitalization $20,000. Has an 88′ shaft, showing ore in bottom assaying 1.4% copper. Idle.

GEORGE E. CARNE y OTRO. **CHILE.**

Mine office: Cobija, Tocopilla, Antofagasta, Chile. Property is the Buena Vista mine, idle some years.

CAROLINA COPPER CO. **NORTH CAROLINA.**

Office: 15 Atwater St., W., Detroit, Mich. Mine office: Cullowhee, Jackson Co., N. C. Lewis C. Waldo, president and treasurer; Thomas A. Cox, vice-president and superintendent; Hugh M. McCormick, secretary; preceding officers, Stephen H. Knight, Geo. W. Clark, Thomas W. Newton, Chas. E. Brodin, David E. Thomas and Edwin P. Snider, directors. Organized Oct. 12, 1901, under laws of Michigan, with capitalization $2,500,000, shares $25 par; issued, $1,585,000. Lands, 1,450 acres, freehold, including the Wayehutte mine, showing 4 veins, of 27′ estimated average width, carrying mainly chalcopyrite, with estimated average values of 3% copper, 4 oz. silver and $1 gold per ton, opened by a 55′ shaft and a 200′ tunnel. Lands, also include an undeveloped water power. Cloud was removed from title August, 1907. Idle for several years.

CAROLINA GOLD & COPPER CO. **NORTH CAROLINA.**

Dead. Formerly at New London, Stanley Co., N. C., and Gap Creek, Ashe Co., N. C. Fully described Vol. VI.

CAROLINA KING MINING CO. **NORTH CAROLINA.**

Mine office: Virgilina, Halifax Co., Va. Organized 1903, taking over property of the Copper World Mining Co., and the Danville & Virginia Copper Mining Co. Lands, in Person county, North Carolina, just south of the Virginia line, include the Copper World mine, having 2 shafts, deepest 100′, in a vein of fair width, showing chalcocite, also carbonate and oxide ores, assaying 5 to 65% copper. Idle.

CARP LAKE MINING CO. **MICHIGAN.**

Office: Cleveland, Ohio. Mine office: Ontonagon, Ontonagon Co., Mich. E. L. Payne, general manager. Organized 1858, under laws of Michigan, and reorganized June, 1878, with capitalization $500,000, shares $25 par. Lands were 1,087 acres, in Town 51 North, Range 43 West, near Lake Superior, but part of holdings have been sold to Porcupine Mountain Copper Co. Property shows native copper, occurring as irregular streaks of high mineralization, ranging up to 40% in copper tenor, native metal occurring in exceedingly thin flakes in strata ranging from fine conglomerate to coarse sandstone. Main bed, of about 7′ width, apparently is not an extension of the Nonesuch lode, as the strata do not resemble each other physically, though carrying copper in a markedly similar manner. Lands have an excellent water-power available from Carp Lake. The mine, opened 1858, has several shallow shafts and a 1,250′ tunnel, and once had a mill with 20 gravity stamps. Idle some years. Very fully described Vol. II.

SOCIEDAD ANONIMA MINAS DE CARRACEDO. **SPAIN.**

Office: Bilbao, Spain. Mine office: Vañes, Palencia, Spain. Property was undergoing development, in a leisurely manner, at last accounts, and presumably is idle.

CARRANZA-LAFONE COPPER MINING & SMELTING CORPORATION, LTD. **ARGENTINA.**

Dead. Property sold, 1904, to Capillitas Copper Co., Ltd. Formerly at Cerro de Capillitas, Tucumán, Argentina.

CARRERAS HERMANOS. BOLI

Office and mine: Coro Coro, La Paz, Bolivia. Principal property is Santa Rosa mine, 280 meters deep, opened 1868, on 2 successive conglom strata, carrying 3 to 4% native copper. Has a concentrator known as the Vista, product being exported to Europe through port of Mollendo, Per barillas de cobre of 82% average copper tenor. Production is 7,000 to long tons of mineral bruto yearly, equivalent to circa 600,000 lbs. fine co estimated by Bolivian government to cost 7.5 bolivars per quintal of copper tenor. Employs circa 300 men.

CARRIE COPPER CO. ARIZ

Dead. Formerly at Globe, Gila Co., Ariz.

CARRINGTON UNITED MINES CO. AUSTRA

Mine office: Charters Towers, Queensland, Australia. T. A. W manager. Lands, 30 miles from Charters Towers, show ore said to av about 10% copper, 1 oz. silver and 0.4 oz. gold per long ton, with an av value of £8. Has a smelter with 3 small reverberatory furnaces. Produc 1907, was 103 long tons ore smelted, yielding 23,520 lbs. fine copper, 8 silver and 39 oz. gold. Production was reported, March, 1908, as circa tons of ore monthly. Smelting costs are very high.

SOCIEDAD DE MINAS y FUNDICIONES DE CARRIZAL. CH

Office: Catedral 2409, Santiago de Chile. Mine offices: Cerro Bl Freirina, Atacama, Chile, and Carrizal Alto, Atacama, Chile. Works o Canto de Agua, Freirina, Atacama, Chile. Samuel Gonzalez-Julio, chair M. Tirapegui and Alberto Fabrês, vice-chairmen; L. Tirapegui, secretary; H. Martin, general manager. Organized June, 1898, under laws of Chile, capitalization 2,100,000 pesos, shares 100 pesos par. The Carrizal Share T Ltd., is a heavy shareholder. Dividends have been as follows: 22½% fiscal year 1899; 14% for 1900; 6.5% for 1901; 6.5% for 1902; 7% for 1 26% for 1906; 10% for 1907. For fiscal year ending Oct. 31, 1906, net p were 732,948 pesos.

Lands are 4 groups, including 14 mines, many of which are idle, main the Carrizal Alto district.

The Amarilla mine, at Cerro Blanco, opened 1867, has a main shaft o meters vertical depth. Ores in upper workings show considerable silver, little at depth. Country rocks are porphyry and limestone. The Am mine, with extensions, in 1907 employed 130 men and produced 7,996 m tons of ore averaging 14% copper, equivalent to circa 2,450,000 lbs. fine co

The famous Carrizal Alto group includes the Armonia and Santa Marg mines, the former, 1,200′ deep, having been a notable producer for many y

The mina Socavon, at Carrizal Alto, has a vein with strike of nearly and south and dip of 60° to 80°, in granite. Ores, to depth of 70 meters oxidized and associated with iron oxides, below which occurs chalcop disseminated in pyrite. Extreme depth is 281 meters, with horizontal wor 250 meters in length.

The Astillas mine, in the Carrizal Alto district, opened 1878, has meter main shaft. The Jarillas or Bronces mine, opened 1881, has a 408 shaft. The Jarillas and Astillas mines, in 1903, jointly produced, with a of 67 men, 3,483 metric tons of 6% ore, equal to circa 450,000 lbs. fine co

Smelter, known as the Chañarcitos, on the Carrizal & Interior railway 6 reverberatories and a 42x84″ blast-furnace using semi-pyritic smelting. is imported coke, and about two-thirds of the mineral treated is calcined. converter department has 5 shells, and slags average about 0.5% co Smelters employ 80 men, at average daily wages of 1.92 pesos, and in 190 reduction of one metric ton of ore required 1.56 workmen-days, with cons

tion of 453 kgs. coal, giving a total cost of 12.325 pesos for labor and fuel, with total smelting costs of 20.64 pesos per metric ton. Smelter in 1903 treated 18,497 metric tons of ore, producing there from 4,957 metric tons of matte, of 48% average tenor, with a net production of 2,379,360 lbs. fine copper.

CARRIZO COPPER CO. **MEXICO.**

Office: 711 Missouri Trust Bldg., St. Louis, Mo. Mine and works office: Ayutla, Autlán, Jalisco, Mex. Col. Kent E. Keller, president and general manager; Whitney Gilbreath, vice-president and treasurer; Jos. T. Schneider, secretary; preceding officers, F. M. Steere, S. E. Walker, Dr. W. H. Perry and Harry B. Keller, directors; Albert L. Waters, resident manager; Chas. H. Williams, mine superintendent; John T. Delaney, mill superintendent; T. A. Dickson, smelter superintendent; Salvador Quintero, engineer. Organized Sept. 15, 1904, under laws of Maine, with capitalization $1,000,000, shares $1 par; issued, $800,000. Had, September, 1908, about $40,000 cash and bills receivable, with liabilities of only current expenses. Annual meeting, second Tuesday in January.

Lands, 204 hectares, also a 50-acre millsite, 70-acre smelter site and circa 10,000 acres miscellaneous lands, mainly well timbered, including the 7,500-acre Palmito ranch. Property includes the mines and mill formerly owned by the Ayutla Copper Co., adjacent to the Carrizo. Lands show andesite, with porphyry and diorite intrusions, with 30 known ore bodies, 12 of which have been more or less developed, these occurring as fissures in andesite, carrying ore shutes of 2′ to 12′ width, 60′ to 600′ long, traceable 3 miles. Principal property is an antigua, known to have been worked from 1700 to 1860, reopened Dec. 1, 1906. Property formerly was worked for native copper and cuprite, shown at and near surface. The oxidized zone, showing practically all the common oxides and carbonates, to a depth of about 100′, is followed by chalcopyrite, with occasional chalcocite.

Workings include the San Felipe shaft of 350′ depth, the Zapatero of 115′, the Chico of 140′ and Medrano of 140′, and other shafts of 90′, 65′, 60′, 50′, 65′ and 40′, with various prospecting pits and shafts. Mine also has tunnels as follows: No. 1, of 497′; No. 2, of 535′; No. 3, of 110′; Vesuvio, 200′; Inyo, 160′; Los Reyes, 220′, and Chico, 526′. Mine has 4,458′ of workings, and is conservatively estimated to show 67,000 tons of ore, with 50,000 tons blocked out for stoping. The ores average about 5.5% copper, 5 oz. silver and $1 gold per ton, silver values increasing with depth.

Equipment includes a 200-h. p. steam plant, furnishing 75 h. p. for the mines, 40 h. p. for the mills and 85 h. p. for the smelter, with an available water power, at Carrizo, rated at 330 h. p., and machinery for a 230-h. p. installation on the ground. Mine has two 25-h. p. hoists and a 3-drill Leyner air compressor. Buildings, 19 in number, include a 30x36′ carpenter-shop, 16x20′ adobe smithy, machine shops, engine-houses and dwellings.

The company has given some consideration to the matter of building a 15-mile narrow gauge railway, through a fairly easy country.

The 100-ton wooden concentrator, 60x100′, has a 6x15″ Sturtevant crusher, 2 rolls, 1 Harz jig, 1 Barton table, 2 Wilfley tables, 2 Card tables and 1 slime table. Machinery is on the ground for a new 150-ton mill, to be erected 1909.

The smelter, on a 40-acre site just north of Ayutla, 1½ miles from the nearest mine, receiving ore by cart and pack trains, is rated at 75 tons capacity, and in a trial run, June, 1908, treated 90 tons daily. The smelter has a Colorado Iron Works 42″ hexagonal blast-furnace, with flue-pipe hot-blast attachment, turning out matte carrying circa 50% copper, 40 to 400 oz. silver and 0.1 to 1 oz. gold per ton, sent to the Aguascalientes works for refining. Fuel is Pocohontas coke, costing, laid down, $19 gold per long ton, and a little

local charcoal may be used. Smelter is planned to do a general custom business, with company furnishing about 60% of the ore treated, and is expected to be blown in during the winter of 1908-1909. The works include a sampling mill and laboratory, and are lighted by electricity.

Miscellaneous improvements include a 4,000′ sawmill and a 6-to- ice-plant. Company plans steady mine development, construction of ore-bins and an aerial tram, doubling the mining equipment and adding a 150-ton blast-furnace to the smelter. About 200 men are employed. Property considered promising and management good.

CARR MINE & COLORADO CO., LTD. COLO.

Dead. Wound up April, 1903. Formerly at Black Hawk, Gilpin Co., Colo.

CARROLL GOLD & COPPER CO. ARIZ.

Mine office: Humboldt, Yavapai Co., Ariz. A. J. Carroll, president; H. Cloud, vice-president; Hon. C. P. Hicks, secretary; preceding officers, J. Head and G. E. Barth, directors. Organized June 2, 1906, with capitalization $750,000, shares $1 par. Lands, 5 claims, area 85 acres, in the Agua Fria district, 6 miles east of Humboldt, showing strong surface indications of copper, opened by a 240′ tunnel showing a vein of 2′ to 8′ width, stated by president to assay a few thousand dollars per ton, which obviously was a slip of the pen, meant for a few dollars per ton, as the company has not made other claims or the possession of any considerable quantity of developed ore of high grade. Has shipped a little ore giving returns of 14% copper.

CARTER COPPER CO. VIRGIN

Dead. Name changed, 1903, to Manassas-Gap Copper-Mines. Formerly at Reager, Rappahannock Co., Va.

GUILLERMO CARVALLO. CHILE

Mine office: Los Loros, Quillota, Valparaiso, Chile. Works office: Llai-Llai, Quillota, Valparaiso, Chile. Operates the Santa Maria and Santa Elena mines, having a vein up to 4 meters in width, with approximately north and south strike and dip of 45°, opened to depth of 60 meters, carrying sulphide ores with calcite gangue. Smelter, known as the Fundicion Llallai, has 1 reverberatory furnace, using English coke costing 21 pesos per ton, 1 ton of coke being required to smelt 3 tons of ore, slags running about 0.5% copper. Product is ejes, of about 50% average copper tenor. Production, 1903, was 3,000 metric tons of ore averaging about 8% copper, making 496,035 lbs. fine copper.

CASA GRANDE COPPER & GOLD MINING CO. ARIZONA.

Dead. Succeeded by Producer Mining & Smelting Co. Formerly at Casa Grande, Pinal Co., Ariz.

CASA GRANDE DEVELOPMENT CO. ARIZONA.

Office: Duluth, Minn. Mine office: Vekol, Pinal Co., Ariz. Henry B. Hovland, president; preceding officer, Lemuel C. Shattuck, Hoval A. Smith, Samuel Kaufman and Edw. N. Breitung, directors; Chas. S. Norris, manager. Capitalization $500,000, shares $10 par.

Lands, 6 miles west of Vekol and circa 38 miles southwest of Casa Grande, are held under 30-month bond and lease, from United-Arizona Copper Co., Ltd. Property shows blanket veins in limestone superimposed on quartzite adjacent to granite-porphyry, and fault veins in limestone. Mine, known as the Reward, opened circa 1893, and idle since circa 1901, until taken over by present company, is opened on the upper bed of 8′ to 10′ thickness, carrying ore assaying up to 12% copper, with good silver values and a little gold. Main shaft, 600′ deep, is opened on the 400′, 500′ and 600′ levels. Property produced, in the past, a little copper, under great disadvantages. Water is secured from an 800′ artesian well. The smelter, built 1892, has a 30-ton water-jacket blast-furnace, too small and antiquated for present use. Shipped, 1907, some 1 grade ore to El Paso smelter.

CASA GRANDE MINING & SMELTING CO. **ARIZONA.**

Dead. Was a swindle perpetrated by Douglas, Lacy & Co., of New York. Formerly at Casa Grande, Pinal Co., Ariz. Described Vol. VI.

CASANO COPPER MINING & SMELTING CO., LTD. **SPAIN.**

Mine office: Cabrales, Oviedo, Asturias, Spain. Organized July 28, 1902, under laws of Guernsey, as a reconstruction of the Oviedo Mines Development Syndicate, Ltd., with capitalization £150,000, shares £1 par; issued, £38,989. Was formed to acquire an option to purchase 15 mining claims, area 738 acres. Idle.

FUNDICION DE CASAPALCA. **PERÚ.**

Owned by Backus & Johnston.

CASCADE COPPER MINING CO. **WASHINGTON.**

Dead. Merged, circa 1902, in Mt. St. Helens Consolidated Mining Co. Formerly at Spirit Lake, Skamania Co., Wash.

CASCADE COPPER MINING CO. **WISCONSIN.**

Office: care of Walter Fowler, manager, West Superior, Wis. Organized circa 1898, with capitalization $250,000, shares $25 par. Lands, 425 acres, in Section 23, Town 48, Range 10, west of the Brule river, in Douglas county, Wisconsin. Idle for some years and apparently moribund.

CASCADE COPPER MINING CO. **WYOMING.**

Dead. Formerly at Encampment, Carbon Co., Wyo. Described Vol. V.

CASCADE COPPER MINING CO., LTD. **BRITISH COLUMBIA.**

Office: Victoria, B. C. Mine office: Alberni, Vancouver Island, B. C. Hon. Dick B. McKay, president; Lawrence Manson, vice-president; W. J. Dowler, secretary and treasurer; preceding officers, H. H. Jones and W. H. R. Whitney, directors. Organized under laws of British Columbia, with capitalization £50,000, shares 25 cents par.

Lands, on the northern shore of Uchuckelsit Harbor, an arm of the Alberni Canal, show an 8′ diabase dyke traversing limestone, impregnated with chalcopyrite and pyrite, selected samples assaying 5.5% copper, 0.12 oz. silver and 0.06 oz. gold per ton, with occasional assays up to 28.3% copper. Development is by several shallow shafts and short tunnels, with 2 opencuts on adjoining outcrops. Mine has a 600′ three-rail gravity tramway, leading from the shaft to a 150-ton bunker on a wharf at tidewater. Has shipped a little ore of fair grade.

CASCADE GOLD & COPPER MINING CO. **WASHINGTON.**

Office: Ashland, Ohio. Mine office: Chelan, Chelan Co., Wash. E. J. Worst, president; D. F. Brubaker, secretary; B. H. Palmer, treasurer. Organized 1901, under laws of Washington, with capitalization $2,000,000, shares $1 par. Lands, known as the Davenport mine, near the head of Horseshoe Basin, are somewhat difficult of access. Mine has a 500′ tunnel, cutting 2 small veins, and sample smelter shipment of 1 ton gave returns of $69 in copper, lead, silver and gold. Presumably idle.

CASCADE MINING CO. **NEW MEXICO.**

Office and mine: Santa Fé, Santa Fé Co., N. M. Geo. M. Kinsell, president; J. W. Mayes, vice-president; Dr. Chas. A. Whedon, secretary and treasurer; preceding officers, A. D. McInturff and J. A. Burlington, directors. Organized circa October, 1907. Lands are in the Pecos National Forest Reserve, near Santa Fé.

CASCADES CONSOLIDATED COPPER CO. **WYOMING.**

Mine office: Encampment, Carbon Co., Wyo. John T. Baker, president and treasurer; W. S. Russell, vice-president and secretary. Organized 1902, under laws of Wyoming, with capitalization $1,250,000, shares $1 par, succeeding the

Cascades Copper Co. Lands, 15 claims, unpatented, including the Pasadena High Five groups, circa 5 miles from Encampment, having a 100′ shaft, sho a 20′ vein, and a 900′ tunnel cutting several small veins carrying aurife and argentiferous copper ores.

CASCADES COPPER CO. WYOMI

Dead. Succeeded, 1902, by Cascades Consolidated Copper Co. Forn at Encampment, Carbon Co., Wyo.

CASCADIA MINING & DEVELOPMENT CO. WASHINGT

Office: 1 Canterbury Bldg., Portland, Ore. Mine office: Spirit L Skamania Co., Wash. E. A. Sessions, president; W. A. Gray, vice- p dent; G. W. Simpson, secretary and treasurer; C. E. Luckel and J. A. G directors. Organized March 12, 1907, under laws of Washington, with capi zation $1,000,000, shares $1 par. Lands, 16 claims, area 320 acres, also 5 sites, in the Mount St. Helens district of Skamania and Lewis counties, cluding the Polar Star mine, opened by tunnel, showing quartz veins traver syenite, carrying mainly chalcopyrite, with some galena and tetrahed associated with pyrite, giving assays of 8 to 25% copper and $5 to $15 per ton, with trivial silver values.

CASHIER COPPER MINING CO. ARIZO

Mine office: Mayer, Yavapai Co., Ariz. Hon. M. P. Snyder, president treasurer; G. W. Bedbury, vice-president and general manager; Wm. A. Ec ley, secretary. Organized January, 1905, under laws of Arizona, with capi zation $1,000,000, shares $1 par. Is controlled, through ownership of majo of stock, by Arizona Diamond Drill Mining Development Co. Lands, 8 cla area 152 acres, in the Agua Fria district, 5 miles northeast of Mayer, sho country rock of Yavapai schist carrying lenticular veins of copper ore silicious gangue, lenses following the planes of schistosity.

CASHIER GOLD MINING & REDUCTION CO. COLORA

Mine office: Central City, Gilpin Co., Colo. Wm. Auger, superinten Lands include the Brooklyn mine, developed to depth of 800′, carrying a erous and argentiferous chalcopyrite and tetrahedrite, principal values b in silver, running up to circa 700 oz. per ton. Has steam power and is a s but steady producer, partly from work of lessees. Employs circa 30 men.

CASH MINE CO. ARIZO

Mine office: Groom Creek, Yavapai Co., Ariz. Harrington Blauvelt, ge manager, at last accounts. Has auriferous copper ore and argentiferous ore. Mine has 2 shafts, with steam power and a 10-stamp mill.

CASH MINING & MILLING CO. COLORA

Dead. Apparently succeeded by American Queen Mining Co. Form at Gold Hill, Boulder Co., Colo.

ANTONIO GÓMEZ CASTELLANOS. MEX

Office and mine: Compañía 48, Zacatecas, Zac., Mex. Property incl La Cobriza and La Iguana mines, carrying gold, silver and copper ores, employing about 35 men, at last accounts.

CASTELLANOS y CA. CH

Mine office: Combarbalá, Coquimbo, Chile. Production, at last acco was about 75 tons fine copper yearly, shipped as matte. Presumably idle.

MINA CASTILLO DEL BUITRON. SP

Owned by Compañía del Ferrocaril y Minas del Buitron.

SOCIEDAD ESPAÑOLA MINAS DEL CASTILLO DE LAS GUARDAS. SP

Office. Apartado 162, Bilbao, Spain. Mine office: Castillo de las Guar Sevilla, Spain. Juan Alonso Allende, president; Victoriano Galdiz, vice-p dent; Francisco De Záraga, secretary; Antonio Gonzalez Nicolás, manag

director; Ramón de Urritia, engineer. Organized July 12, 1901, under laws of Spain, with capitalization 7,500,000 pesetas, shares 500 pesetas par.

Lands, 153 hectares, on which considerable development has been secured, 23 kilometers from Zalamea La Real, having a private railroad of 15.5 kilometers running from Castillo de las Guardas to Estación Ronquillo, on the Ferrocaril Sevilla y Cala. The company maintains a school for employes. Property considered promising.

CASTLE DOME COPPER CO. **ARIZONA.**

Office: Calumet, Mich. Mine office: Globe, Gila Co., Ariz. John R. Ryan, president; Geo. Hall, Jr., secretary; Bat. Quello, treasurer; preceding officers, Michael Richetta, Adolph F. Heidkamp, Paul Schneller, Jacob Utti, Matt Draziek and Thos. Hoffman, directors. Organized under laws of Arizona, and reorganized, Apr. 3, 1908, with capitalization $600,000, shares $10 par.

Lands, 12 claims, area circa 240 acres, 17 miles west of Globe, near the Continental mine of the Old Dominion, on the eastern side of Pinto Creek, with deepest workings of 300', in schist and diorite.

CASTLE DOME DEVELOPMENT CO. **ARIZONA.**

Dead. An honest mining failure. About $30,000 was expended on development work and notices were issued, November, 1907, that money paid in would be refunded shareholders by the promoters. Formerly at Globe, Gila Co., Ariz.

CASTLE DOME EXPLORATION & REDUCTION CO **ARIZONA.**

Office: care of B. L. Worthen, president, Tucson, Ariz. Mine office: Yuma, Yuma Co., Ariz. Chas. F. Flack, secretary and treasurer; Jas. H. Bennett, general manager. Capitalization $500,000, shares $10 par. Lands, 17 claims, area 320 acres in the Castle Dome Mountains, circa 30 miles northeast of Yuma. Occasional small shipments have been made to smelters in San Francisco, during the past 25 years, these ranging from 37 to 52% copper; 50 to 70 oz. silver and $8 to $20 gold per ton. Development is by 10 open-cuts, and shallow shafts, deepest only 80'. Property shows a wide mineral zone, carrying ore bodies in schist, with a porphyry contact to the north, and quartzite and limestone to the south. Idle and apparently moribund.

CASTREJÓN HERMANOS. **MEXICO.**

Office and mine: Huacana, Ario, Michoacán, Mex. Property is the China mine, a small producer of copper for some years. Employs circa 25 men.

CASTRO-GRECIAN MINING CO. **UTAH.**

Office: care of Dr. P. Kassmikos, president, Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah L. C. Moore, secretary and treasurer. Organized 1905, under laws of Utah, with capitalization $1,500,000, shares $1 par. Company is composed exclusively of Greek residents of Utah. Lands, sundry claims at Bingham, near the United States mines, also miscellaneous claims in Carbon, Emery and Wasatch counties, Utah. Latter lands apparently sold, circa September, 1905, to Uintah Mining, Milling & Development Co. In June, 1907, was planning to begin development.

CATALINA COPPER CO. **MEXICO.**

Office: Bisbee, Ariz. Mine office: La Cananea, Arizpe, Sonora, Mex. Organized February, 1904, with capitalization $500,000, shares $10 par. Lands are circa 30 miles south of La Cananea. Idle and apparently moribund.

CATALINA COPPER MINING CO. **ARIZONA.**

Dead. Formerly at Tucson, Pima Co., Ariz. Fully described Vol. V.

CATARACT COPPER MINING CO. **MONTANA.**

Office: 308 The Bourse, Philadelphia, Pa. Mine office: Basin, Jefferson Co., Mont. Carl G. Weidinger, president; Samuel B. Vrooman, vice-president; Hon. Marcus L. Hewett, second vice-president and general manager; John H.

Cromie, Jr., secretary; J. L. Ketterlinus, treasurer; preceding officers, K. Newell and Carl F. Boker, directors; Leverett S. Ropes, superin Organized May 14, 1901, under laws of South Dakota, with capit $2,500,000, shares $5 par.

Lands, 21 claims, area 420 acres, also 300 acres of placer claims Cataract district, circa 12 miles from Basin, including the Bullion, I Gray Eagle, Cataract, Yellow Gambler, Timbuctoo and Goldbug claims, of which were worked in early days for gold. Country rock is grani intrusive porphyritic dykes, carrying fissure veins, ore being mainly ous pyrite, with some tetrahedrite, having a gangue of quartz and altered granite. Zone of oxidation is shallow.

Property has 2 veins, one known as the Bullion having been trac 8,000', and proven for nearly 3,000', this being 10' to 20' wide, with of commercial ore, and a 2' paystreak of smelting ore, the Bullion min nearly 2 miles of workings. Development is by 4 tunnels, includ Crystal tunnel of 1,100' and the No. 3 tunnel, which apparently has from claimed lengths of 5,000' and 3,600', down to 1,212' length.

The Buckeye mine is said to show a 20' vein of ore of concentratin with a 4' paystreak of smelting ore. The mines, as a whole, are cla have circa 1,000,000 tons of low grade ore in sight, averaging about 2% with gold and silver values.

Equipment includes a power plant with 6-drill air-compressor, an sary mine buildings.

The concentrator, of 150 tons nominal daily capacity, and actual of about 100 tons, seems to have been built wrong, and has given con trouble.

The 250-ton smelter has a 44x144" Colorado Iron Works water-jack furnace, taking blast heated to 800° F. in a "U" stove, a 150-h. p Connersville blower and a small electric plant. The smelter is ver located for economical receipt of coal and fluxes.

A trial run of 6,000 tons of ore, 1905, gave a 10 to 15% mat average extraction from ore of 2.29% copper, 18 oz. silver and $7 per ton.

The company has been in financial straits almost since organizat has redeemed none of the extremely liberal promises made from time The promoter of the company, Marcus L. Hewett, is said to have dividual profits of $75,000 from the sale of the company's stock. T management is good.

CATARACT COPPER MINING CO. WY

Dead. Was a twin of the Cascade Copper Mining Co. Formerly campment, Carbon Co., Wyo.

CATAS VIEJAS COPPER CO. M

Office: 211 Binz Bldg., Houston, Texas. Mine office: Tepezalá, Aguascalientes, Mex. A. L. Hays, president; G. H. Barnes, secret treasurer.

CATAS VIEJAS MINING CO. M

Office: Iron Block, Milwaukee, Wis. Organized under laws of with capitalization $250,000, shares $1 par. Claims to have lands so in Mexico, but location not learned, despite requests. In Decemb advertised that every share then bought doubtless would be worth $2 1 year, but this was a very bad guess. Apparently a wildcat.

SOCIÉTÉ DES MINES DE CUIVRE DE CATEMOU.

Office: 50 Blvd. de la Senne, Brussels, Belgium. Mine offices: E Putaendo, Aconcagua, Chile, and Nogales, Valparaiso, Chile. Work

Nilgue, Estación Chagres, Putaendo, Chile, and Melon, Quillota, Valparaiso, Chile. Max Lyon, president; preceding officer, Comte Leopold-Fernand-Balny d'Avricourt, Comte Hubert Delamarre, Octave Maggiar, Emil Parif, Eugene Renevey, Ernest Stouls, D. Ghesquierre, Adam Collignon, A. L. Pearse, Georges Renevey, L. Consis and R. Franklin, directors; Guillaume Wouters, secretary; H. Macnutt, general manager; F. C. Vigeon, superintendent; J. R. Starkey, mill superintendent. Organized June 2, 1899, under laws of Belgium, with capitalization 5,000,000 francs, shares 500 francs par, divided into 10,000 preference shares at 8%, and 35,000 ordinary shares without stated value. Debentures, 2,500,000 francs authorized, at 5%; issued, 1,070,000 francs. Annual meeting, last Friday in June

Lands, 155 claims, with sundry miscellaneous tracts, held in fee and under government concessions, including a hacienda of 7,500 hectares, giving total landed holdings of about 30,000 acres, in the districts of Putaendo, Los Andes, Melipilla, La Ligua, Quillota and El Nilgue.

The local management reports that ores carry an average of 6% copper, but a director stated, 1903, that the average would be only about 3.5% copper and 2 oz. silver per ton. Veins carry the usual oxidized ores near surface, in a comparatively shallow surface zone, succeeded by chalcocite, bornite and chalcopyrite.

El Solado mine, opened 1841, at Putaendo, one of the Nogales group, shows a series of veins with approximately north and south strike and dip of 45° east, between trachyte and feldspar-porphyry. There are 15 known veins, with average width of 5′ to 7′, composed mainly of quartz, impregnated with copper sulphides, while several veins carry oxidized copper ores, with gangue of aluminous silicates. This series of veins frequently is faulted, with throws of 1 to 2 meters, and there is another series of dykes and veins crossing at approximately right angles to the dip, but with parallel strike, which is unusual, dykes being partly decomposed porphyry, carrying occasional oxidized ores and aluminous silicates. These veins have been worked extensively in the past, showing many antiguas, and average 7 to 8% in copper tenor. Development is mainly by tunnels, greatest vertical depth obtained being 80 meters, and old workings are about 150 meters in length. This mine shows some immense chambers, one being called the cathedral, in recognition of its vast size. The Mantos Rojos of the Nogales group, opened 1820, has 2 blanket veins, of 5′ to 7′ thickness, composed of calcareous matter impregnated with chalcopyrite to an estimated average of about 4% copper. These blanket veins have been worked on a large scale, since circa 1835, and, while low in grade, the ores are especially suitable for fluxing purposes, and, by reason of the vast size of the ore bodies, the Mantos Rojos offers great possibilities of future production.

Miscellaneous mines include El Cobre de Melon, in the Quillota district, opened 1886; El Nilgue mine, in the department of Putaendo, opened 1886; Las Maquinas de Catemú mine, in the department of Putaendo, opened 1870; La Esmeralda mine, opened 1860; La Constancia and La Democracia mines, circa 10 kilometers from the smelter, carrying blanket veins; the Marquesa Malva, Tabourina, Caracoles, Almendro y Pleito, La Poza and other properties, in various stages of development,, some of considerable promise.

La Poza smelter, at Chagres, is 12 kilometers from Chagres station, on the Andes railroad. These works include a concentrator, of modern design and equipment, having mainly American machinery. The mill, of 60 tons rated capacity, has 7 Wilfley and Ferrari tables, and slime tables. La Poza smelter, of 400 tons daily capacity, has two old 75-ton rectangular water-jacket blast furnaces, and new blast-furnaces of 36x96″ and 36x120″ dimensions at the tuyeres, turning out 45% matte. The converter department has five 57x77″

shells, with 12 tuyeres each, of the Copper Queen type, turning out Chile
carrying 99.7% copper and 32 oz. silver per ton. There is a 40-ton briquet
plant, and the converter department has a quartz mill. Power is furni
by a 165-h. p. Pelton water wheel and 175-h. p. engine. Furnace blast is
plied by No. 6 Connersville blowers, and converter blast is furnished b
Riedler air-compressor, with capacity to reduce 20,000 cubic feet of free
per minute to 15 lbs. pressure. Fuel is coke, one ton of coke smelting
tons of ore, ores treated being highly silicious, with slags averaging 0.
0.5% copper. In 1903 La Poza smelter treated 19,063 metric tons of ore
6% average tenor, obtaining therefrom 1,046.25 metric tons fine copper,
ploying 90 men, at average wages of 2 pesos daily.

El Cobre del Melon smelter, 16 kilometers from Estación del Melon, on
Calera & Cabildo railway, has a 36x84" Allis-Chalmers cylindrical water-ja
blast-furnace, making ejes, which are sent to La Lota and La Poza sme
for conversion. Ores smelted at this plant carry excess of silica and alum
and are deficient in sulphur, necessitating the free use of low grade cuprif
pyrite and limestone, for fluxing. Fuel is very expensive, coke costing
pesos per metric ton, and English coal 31 pesos per ton, one ton of fuel sme
about 3.5 tons of ore. Equipment includes a Pelton water wheel, 60-h. p.
motive and Green No. 6 blower. A 4-kilometer aerial tram is proposed t
Nogales group. In 1903 these works employed 40 men, at average wag
2 pesos daily, treating 8,882 metric tons of ore averaging 6% copper, prod
therefrom 928 tons of ejes, of 45.5% tenor, carrying 422,240 kgs. fine co
It is planned to greatly enlarge this smelter by adding a 48x120" Allis-Cha
blast-furnace, converter plant, Babcock & Wilcox boilers, Corliss engine
Riedler air-compressor, increasing the smelting capacity to 40,000 metric
of ore yearly.

Los Mantos mines are capable of a large output, and the manageme
progressive. Production, 1903, was 15,851 metric tons of ore averaging
copper. With improvements at the smelters the capacity of the property sh
be increased to nearly or quite 6,000 metric tons of fine copper yearly.
duction, 1905, was 4,401,270 lbs. fine copper.

SOCIEDAD NACIONAL DE MINAS i FUNDICIONES DE CH
CATEMU i MELON.

Office: Valparaiso, Chile. Organized Sept. 7, 1906, under laws of C
with capitalization 2,000,000 pesos, shares 50 pesos par. Obviously is cl
related to Société des Mines de Cuivre de Catemou, and probably is
Chilean incorporation of that company.

SOCIEDAD MINERA DE CATIGUA. CH

Office: Santiago de Chile. Mine office: Tarapacá, Tarapacá, Chile. O
ized Dec. 13, 1906, under laws of Chile, with capitalization £230,000, s
£1 par.

CAUCASUS COPPER CO., LTD. RU

Office: 3 Bond Court House, Walbrook, London, E. C., Eng. Mine o
Dzansul, Kutais, Russia. A. A. Swan, chairman; preceding officer, J. Do
J. Colquhoun, M. Grancini, E. V. Lockhart and J. N. Sparks, directors;
F. Allan, general manager; W. R. Van Liew, smelter superintendent; F
Knox, consulting engineer; John Tripp, secretary. Organized Oct. 4,
under laws of Great Britain, with capitalization £500,000, shares £1
Debentures, £500,000, at 6%. Property was bought for £398,988. Com
to October, 1907, had expended £247,150 on development and improvements.

Lands are 6 groups, including the Dzansulski copper and silver-lead m
in the Murgne Gorge, Artvin district of the government of Kutais, in
Russian Caucasus. Mine is developed extensively, company estimating rese

at 3,600,000 long tons, of 3.1% copper ore, practically in sight. Ore is chalcopyrite, with a silicious gangue, occurring in a mammoth lense of 50 to 100 meters width, with about 300 meters length. Mine is worked open-cast, and ore is trammed to the mill.

The mill, nominally of 500 tons daily capacity, planned as the first unit of a 1,000-ton mill, has electric power, with automatic operation throughout. The ore slimes badly in concentration, and is so high in silica and so deficient in iron that heavy fluxing is necessary, in a district where fluxing ores are secured with difficulty. Wet concentration having proved unsatisfactory, the process was changed. Equipment includes Blake crushers and series of grinding rolls, with screens, ore being taken by belt conveyers to the roasters. The process of reduction in use requires the fine crushing of ore, which is minutely subdivided, followed by roasting to change the iron sulphides to iron oxides, after which the ore goes to a Wetherill magnetic separation plant which carries over the iron oxide, taking with it the copper, giving a concentrate of about 25% copper tenor. The mill has given considerable trouble in operation, but apparently will be adjusted, eventually.

The old works had a small smelter, which was increased to 300 tons capacity, and rebuilt, 1907-1908, to 500 tons daily capacity. Production, 1904, was 1,946,360 lbs. fine copper, and for fiscal year 1905, was 511,920 lbs. fine copper. Property is considered valuable, though as yet it cannot be called a mine.

CAVE CREEK MINING CO. **ARIZONA.**

Mine office: Cave Creek, Maricopa Co., Ariz. G. J. Corsot, president; Frank Dournier, secretary. Has authorized a $40,000 bond issue. Lands, 4 claims, and 80 acres, and 5-acre millsite, formerly held by Mormon Girl Mining Co., showing two 4′ contact veins, between granite and slate, claimed by former owners to give average assays of 6 to 8% copper, 4 to 15 oz. silver and $4 gold per ton, which was a grievous overestimate, from silicious oxides and carbonates, and copper silicates. Development is by 500′ shaft and a 400′ tunnel. Has steam power and several mine buildings, also a 25-ton mill with 5 stamps and a 20-ton Huntington-Heberlein mill, and a 25-ton leaching and cyanide plant. Idle at last accounts.

MINA DA CAVEIRA. **PORTUGAL.**

Mine office: care of Crookson & Hawkins, owners, Grandola, Portugal. Was undergoing development at last accounts.

CAVIN MINING & MILLING CO. **CALIFORNIA.**

Office: Stockton, Cal. Mine office: Raymond, Mariposa Co., Cal. E. W. King president and general manager. Lands, 12 claims, having tunnels of 40′ to 650′, and 6 shafts, of 50′ to 175′ depth. Has shipped a little ore.

SOCIEDAD EXPLOTADORA DE CAYLLOMA. **PERÚ.**

Office: Valparaiso, Chile. Mine office: Arequipa, Perú. Organized May 31, 1906, under laws of Chile, with capitalization £32,000, shares £1 par.

CEDAR CANYON SMELTING & REDUCTION CO. **WASHINGTON.**

Mine office: Springdale, Stevens Co., Utah. W. Sheck, general manager. Lands, on the Columbia river, west of Springdale, show copper sulphides. Company is said to plan a 50-ton mill.

CEDAR FOREST GOLD & COPPER CO. **ARIZONA.**

Dead. Formerly at Kingman, Mohave Co., Ariz. Described Vol. VI.

CEDAR MINING CO. **UTAH.**

Mine office: Milford, Beaver Co., Utah. Lands, 12 miles from Milford, have a 275′ shaft showing argentiferous copper ores with values mainly in silver.

CEDAR VALLEY GOLD & SILVER MINING CO. ARIZO

Mine office: Cedar, Mohave Co., Ariz. Philip P. Baker, superintend Lands include the Arnold, Silver Queen and other claims. Ores carry g silver and copper. Has steam power and a 15-stamp mill. Presumably idl

CELTIC COPPER CO. ARIZO

Office and mine: care of Archibald Morrison, Clifton, Graham Co., A Lands, 16 claims, area 320 acres, circa 15 miles from Clifton, opened by a shaft. Shipped, 1907, circa 200 tons of sulphide ore of about 19% copper te Presumably idle.

CENTENNIAL-BINGHAM MINING CO. UT

Dead. Succeeded, Feb. 11, 1904, by South Columbus Mining Co. merly at Park City, Summit Co., Utah.

CENTENNIAL COPPER MINING CO. MICHIG

Office: 60 State St., Boston, Mass. Mine office: Calumet, Houghton Mich. H. F. Fay, president; Geo. G. Endicott, secretary and treasurer; J MacNaughton, general manager; preceding officers, A. Agassiz, F. W. Hun well, Quincy A. Shaw, Jr. and R. L. Agassiz, directors; John Pentecost, min captain.

Organized 1896, under laws of Michigan, as successor of Centennial Min Co., with capitalization $2,500,000, shares $25 par; issued, $2,250,000, with $19 per share paid in. Last assessment, 1905, was $4. Is controlled, through o ership of circa 46,000 shares, a majority of the stock issued, by the Calu & Hecla Mining Co. Old Colony Trust Co., Boston, registrar. Annual meeti first Tuesday in April.

The company's floating debt, amounting to $335,894.24 on Jan. 1, 19 was met, partially, by the sale of the mill, for $300,000, to the Lake Milli Smelting & Refining Co., which corporation the Centennial owns jointly w the Allouez Mining Co. Company ended 1907 with accounts payable $31,366.58.

Lands, circa 670 acres, being Section 12, Town 56 North, Range 33 W also a triangular patch of about 30 acres, at the southeastern corner of the m tract, bought to secure the outcrop of the Kearsarge lode, and including ab 10 acres, bought, 1905, of the Old Colony for the surface plant. The first w was done, 1863, by the Schoolcraft Mining Co., which failed to open a pay mine, and was reorganized, 1876, as the Centennial Mining Co., and again r ganized, 1896, with present title. Expenditures of upwards of $1,500,000 w made, mainly by the old companies, in unsuccessful efforts to open a pay mine on the northern extension of the Calumet conglomerate. Seven shaft of considerable depth, were sunk on this bed, No. 3, the deepest, being tomed at 3,200′. The Centennial lands are in the great mining camp of C met, and are available for building purposes. Two additions have been plat and the lots sold at good prices. Only surface rights are sold, mineral be reserved.

The present company did a few months' work, in 1897, on the old congl erate shaft, then turned attention to the Osceola lode, deepening 2 sha shafts to 1,050′ and 1,150′ depth respectively, shafts being 17x12′ inside timbers, sunk at 38°. The Osceola lode, where opened on the Centennial t averages about 15′ width, but is lean.

Work on the Kearsarge lode was begun September, 1899. Owing to outcrop of the Kearsarge occurring on the 30-acre tract bought of the Osc with only 100′ right-of-way connecting it with the main tract, it was neces to open the mine on the Kearsarge lode in a peculiar manner, by 2 sh These are but 90′ apart, on surface, and continue parallel, on the dip of lode, until the 13th level, when the main tract is reached, after which N shaft diverges from No. 1 at an angle of 15° on the plane of the lode,

being taken by the curve. This method of opening gives short drifts until the shafts enter the main Centennial tract. Each shaft is 17x18′ inside of timbers, with 3 compartments, sunk at an angle of 39° with the horizon, through an overburden of about 100′ depth. The Kearsarge lode averages about 16′ in width, and showed fair copper values in the upper levels, followed by a comparatively barren zone until the 14th level, when there came a gradual improvement. The mine has large ore reserves opened, and should get the rich Wolverine ore chute at depth.

No. 1 shaft, 3,070′ deep, can be sunk circa 12,000′ before reaching the boundary. No. 1 has a steel shaft-rockhouse, with 3,000-ton bins and a 32x72″ Nordberg duplex hoist, with double conical drum, good for depth of 6,000′, operating 5-ton skips.

No. 2 shaft, circa 3,100′ deep, cut down, 1907, to 3 compartments, shows good ground from the 28th to the 31st levels, inclusive. Equipment includes a cylindrical steel shaft-rockhouse with 1,000-ton bins, and a 32x60″ Sullivan duplex straight-face hoist, with 2 drums of 14′ diameter and 15′ 6″ winding face, grooved for 1⅜″ cable. The hoist is fitted with devices to prevent overwinding, and is calculated to raise 5-ton skips at the rate of 4,000′ per minute, operating under 150 lbs. steam pressure.

The principal mine buildings are of Lake Superior redstone, finished ashlar, and include duplicate engine-houses for the 2 shafts. The new compressor house, 32x78′, has a 70-drill Laidlaw-Dunn-Gordon 2-stage compound air-compressor, and the old compressor house, 32x46′, has 35-drill Nordberg and 20-drill Rand air-compressors, with a Dean jet condenser in the basement. A 34x58′ boiler-house has four 125-h. p. Burt locomotive-firebox boilers, and a 125′ brick-lined self-supporting steel smokestack of 7′ diameter. A 16x46′ frame pumphouse, with corrugated iron roof, has a fire-pump, fire-hose and hose-carts. The combination machine-shop and smithy is 50x108′, with steel truss roof, having traveling cranes, with railroad track from end to end. Miscellaneous buildings include a 36x50′ carpenter shop, 30x40′ warehouse, 30x40′ office building, and a 25x50′ changing house with hot and cold water, baths, lockers, etc. There also is a large number of dwellings for employes, the surface plant being well planned and substantial.

The mine is served by the Copper Range and Mineral Range railroads, and has a private line connecting the shops and shafts.

Rock is stamped by the mill of the Lake Milling, Smelting & Refining Co., which is separately described. The Centennial employs about 400 men.

Production was begun July 5, 1904, and output of fine copper has been as follows: 641,294 lbs. in 1904; 1,446,584 lbs. in 1905; 2,253,015 lbs. in 1906 and 2,373,572 lbs. in 1907. Rock hoisted, 1907, was 225,271 tons, of which 200,040 tons were milled, discard being 11.2%, producing 3,604,970 lbs. mineral, which averaged 65.842% fine copper, the production of copper per ton of rock stamped, 1907, being 0.593%, or only 11.86 lbs., as against 0.679%, or 13.58 lbs., in 1906, a very discouraging showing. For the first half of 1908 about 87,000 tons of rock were stamped, a decrease of about 5,000 tons, yielding circa 1,670,000 lbs. of mineral, an increase of about 70,000 lbs. Production, October, 1908, was at the rate of about 15,000 tons of rock monthly, and production of copper for 1908 should prove slightly larger than in the preceding year. The mine was looking somewhat better, late in 1908. Costs per ton, less construction, have been as follows: $3.54 in 1905; $2.21 in 1906, and $2.34 in 1907.

It is possible, and even probable, that the Calumet conglomerate may be worked to advantage, eventually, under the management of the Calumet & Hecla, though this would not be possible were the Centennial an independent company. It is possible that something may be done also with the Osceola land, on the Centennial tract.

CENTENNIAL-EUREKA MINING CO.

Office: 50 Congress St., Boston, Mass. Operating office: 508 Do Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. Wm. G president; Alfred F. Holden, managing director; preceding officers, Coolidge, Robert D. Evans, Clarence A. Hight, J. J. Storrow and S Winslow, directors; F. Winthrop Batchelder, secretary and treasur Allen, superintendent. Organized 1876, under laws of Utah, and re 1899, under laws of Maine, under same title, with capitalization $ shares $25 par; issued $2,500,000. Company is controlled by the Unit Mining Co., which holds all but circa 100 shares. National Shawm Boston, registrar. Annual meeting, third Wednesday in April.

Lands, in the Tintic district, include the Centennial, Eureka, Tint Swan and Pelican groups. A suit over land, against the Bullion Beck pion Mining Co., was dismissed, 1908. Mines are extensively develo ducing ore of 2 grades, the oxidized ores carrying high values in gold a while the low grade deposits, though of enormous extent, carry only s and silver values. The east fissure has upwards of 500,000 tons of or out, and reserves, 1905, were estimated by J. Parke Channing at 600, carrying average values of $11.88 per ton.

Forces are circa 300 men. Production, 1907, was 2,310 carloads about 80,000 tons. Property is valuable and under good management.

CENTENNIAL MINE. CO

Office and mine: Georgetown, Clear Creek Co., Colo. David general manager; S. G. Evans, superintendent. Lands, circa 640 ac cupriferous gold and silver ores in a 30" paystreak, assaying up to 24 5 to 150 oz. silver and 3 to 5 oz. gold per ton. Has steam power.

CENTENNIAL MINING CO. MI

Dead. Reorganized, 1896, as Centennial Copper Mining Co. For Calumet, Houghton Co., Mich.

CENTRAL ALASKA GOLD & COPPER CO. A

Dead. Succeeded, 1907, by Chisna Consolidated Mines Co. For Landlock, Prince William Sound, Alaska. Described Vol. VI.

CENTRAL BLACK HILLS COPPER CO. SOUTH D

Office: 701 New England Bldg., Cleveland, Ohio. Mine office Custer Co., S. D. O. L. Olmsted, president; Chas. Waite, vice-presi manager; W. H. Buffum, treasurer; Alex Cameron, Jr., secretary. July, 1902, under laws of South Dakota, with capitalization $1,500,00 $1 par; was practically reorganized, and management changed, April,

Lands, 6 claims, area 600 acres, also a 40-acre millsite, and 80 ac laneous lands, in the Pennington district, showing 2 contact veins, betw and quartzite, of 18' claimed average width, opened by shafts of 108' and by tunnels of 102' and 225', showing malachite, azurite and cha said to give average assays of 6% copper, 2 oz. silver and $4 to $200 ton. Ore was expected by old management to average about 3% actual treatment, which probably was an overestimate. Has a 200-h. plant, and a mill with 2 crushers and 4 jigs, and a 100-ton leaching p a sawmill. Property shows large bodies of low grade ore that possib be leached to advantage. Idle.

CENTRAL CHILI COPPER CO., LTD.

Office: 15 Angel Court, Throgmorton Court, London, E. C., Eng. works office: Panulcillo, Ovalle, Coquimbo, Chile. Eugene A. J. Go chairman; Bertrand C. Hinman, managing director; Harris K. Masters manager; Herbert Brownhead, secretary; Thos. Higgins, smelter sup ent; H. M. McLaughlin, engineer. Organized Jan. 10, 1898, under Great Britain, as a second reconstruction of the Panulcillo Copper

th capitalization increased, November, 1905, to £500,000, shares £1 par; issued, 12,468. Debentures outstanding, £8,075, at 4%, convertible into fully paid ares at option of holder. Net earnings, 1905, were £10,932, and 1906 were 4,913. Dividends were 6d. in 1900; 6d. in 1901, and 1s. in 1907.

Lands, 56 hectares, at Panulcillo, including the Panulcillo and San Gregorio roups, showing strong lenses of ore up to 150′ in width, with generally north nd south strike and dip of about 45°, worked to depth of 200 meters and length f 1,500 meters. Ore is mainly chalcopyrite, associated with pyrite in lime-tone gangue, with malachite, azurite and chalcocite produced in commercial uantities.

The Condesa mine, 3 kilometers from Panulcillo, has a 5′ vein, with nearly orth and south strike, and is opened to depth of circa 100′ only. Production, 1903, was about 600 metric tons of 6% ore.

The Cocina and Inagotable mines, at Ferro Negro, show lenses up to 70′ in width, with dip of about 45°. Production, 1903, was only 1,200 metric tons of 5.5% ore, but probably was very much larger in 1907, the Cocina group of 4 mines being said to show nearly 2,000,000 long tons of ore.

The Nisñiles mine has a stockwork, opened by 3 tunnels to depth of circa 300 meters, and produced, 1903, circa 2,500 metric tons of 4.5% copper ore.

The 400-ton smelter, connected with the Panulcillo mine by tram, is equipped with 3 calcining furnaces, 2 reverberatory furnaces and three 42x84″ blast-furnaces. The company's ores, being rich in sulphur, permit their smelting in connection with silicate custom ores. The works have a converter department, with quartz mill and crushers for linings, power being furnished by three 160-h. p. boilers, three 60-h. p. engines and 2 Connersville blowers. Fuel is imported coke, costing 40 pesos per ton, and imported English coal, costing 23 pesos per ton, one ton of coke smelting 7.7 tons of ore.

Labor is somewhat scarce, forces employed being about 250 men at the mine and 200 men at the works, at average wages of 1.5 pesos daily.

Production, 1905, was 4,596,480 lbs. fine copper, and for 1906 was 4,159,680 lbs. fine copper. The mines, though low in grade, are carefully handled, by a prudent management, and the smelter is modern and profitable.

CENTRAL CONSOLIDATED COPPER CO. **MEXICO.**

Office: Hibbing, Minn. Operating office: Douglas, Ariz. Letter returned unclaimed from former mine office, Fronteras, Arizpe, Sonora, Mex. Organized 1907, succeeding La Union Consolidated Copper Co. Lands, 240 hectares, including La Reina de Cobre group, in the Tordillo district of the Ajo Mountains, about 25 miles west of Fronteras. Mine has a 100′ shaft showing a 13″ vein said to give average assays of 13 oz. silver and $12 gold per ton. Shipments of 230 tons taken from depth of 40′ returned 6% copper, 3.5 oz. silver and $7 gold per ton. Property considered promising. Idle at last accounts.

CENTRAL COPPER CO. **ARIZONA.**

Office and mine: Globe, Gila Co., Ariz. Patrick Rose, treasurer; F. L. Toombs, manager; W. J. Powell, mine superintendent. Capitalization $100,000, shares $1 par. Lands, 3 claims, between the Union and Gibson, on the divide between Mineral Creek and Pinto Creek, having a 160′ shaft cutting a 4% ore body with paystreak of 30% copper tenor.

CENTRAL COPPER MINING SYNDICATE. **AUSTRALIA.**

Mine office: Cobar, Robinson Co., N. S. W., Australia. Lands, 80 acres, lying 3 miles north of the Queen Bee mine, prospected during 1907, showing ore giving fair assay values in gold, silver and copper. Presumably idle.

CIEDAD MINERA CENTRAL DE COLLAHUASI. **CHILE.**

Office: Santiago de Chile. Mine office: Collahuasi, Tarapacá, Chile. Organized Feb. 14, 1906, under laws of Chile, with capitalization 90,000 pesos, shares 15 pesos par.

CENTRAL GOLD & COPPER CO. NEW MEX

Dead. Formerly at Mineral Hill, San Miguel Co., N. M.

LA GRAN FUNDICION CENTRAL MEXICANA. MEX

Is the Aguascalientes plant of the American Smelting & Refining Co.

CENTRAL MINE. MICHI

Owned by Frontenac Copper Co.

CENTRAL MINING CO. MICHI

Dead. Property sold, circa 1905, to Frontenac Copper Co., and final dend in liquidation, 98 cents per share, paid March, 1908, and company w up. Company paid total dividends, 1864-1908, of $2,049,600. Formerl Central Mine, Keweenaw Co., Mich. Described Vols. I. and II.

CENTRAL MINING CO. WASHING

Mine office: Keller, Ferry Co., Wash. Jas. LeFevre, general man Lands, sundry claims developed by a 60′ shaft showing ore assaying 3 to copper.

CENTRAL MINING & DEVELOPMENT CO. ARIZ

Mine office: Winkelman, Pinal Co., Ariz. Irvin Jordon, president; Werner, vice-president; preceding officers, T. B. Enochs, J. A. McCabe an A. F. Angeni, directors; V. K. Heinberg, secretary; F. B. Garden, sup tendent. Organized July 13, 1906, under laws of Arizona, with capitaliz $10,000,000, shares $1 par. Lands, 9 claims, one fractional, area 175 ac millsite and a 160-acre ranch. Lands include the Two Queens mine, 7 from a railroad, having 4 nearly parallel veins and a cross vein, one showing surface ore claimed to assay $200,000 gold per ton, which is too to be true. Mine has shafts of 21′, 38′, 50′, 155′ and 184′, and a 440′ tu showing ore with quartz gangue, from which selected samples have given assay values in gold and silver, with a little copper. Has a 25-h. p. gas hoist and an air-compressor. Despite the marvelous assays, 3 small sm shipments, 1907, gave returns of only $36.53 per ton. Company was pron by Frank H. Horn, of Kansas City, Mo., but he dropped out and entire ma ment was changed, September, 1908.

CENTRAL SIBERIA, LTD. SIBE

Office: Dashwood House, London, E. C., Eng. Marquis of Winch chairman; E. A. Maund, managing director; Wm. Owen, secretary. Orga Dec. 6, 1906, under laws of Great Britain, with capitalization £10 shares £1 par; issued, £90,000. Property consists of sundry options on mi properties, including copper deposits circa 40 miles from Verchneoodinsk, T baikal, Siberia, on the Siberian railway between the Selenga and Chilok ri showing quartz veins carrying native copper and carbonate ores.

CENTRE STAR CONSOLIDATED MINING CO. BRITISH COLUM

Mine office: Rossland, Trail district, B. C. E. B. Kirby, manager. O ized January, 1906, as successor of Centre Star Mining Co., and is contr through stock ownership, by Consolidated Mining & Smelting Compan Canada, Ltd. The Centre Star Mining Co. paid, 1895-1904, dividend $210,000.

The mine has a 3-compartment main shaft, with dip of only 17°, h 14 levels opened, at intervals of 125′ to 175′ on the slope, which is sinkin the 16th level, which will give a total depth of 2,400′, rendering it the de in Canada. Drifts, where possible, are run along the footwall. Ore country rock stand well, requiring practically no timbering, and the mine especially wet. There are loading pockets at each level. Veins range 6″ to 40′ in width, with pay chutes extending, in some cases, from wall to and forming local enrichments, walls being very indistinct, ore shading int country rock. There are several veins, the most important being the C Star, on which the mine is opened mainly, this being a large shear-zone fi

carrying chalcopyrite disseminated in pyrite and pyrrhotite, with occasional arsenopyrite, having good gold values and small silver values. The lowest levels show good ore. The Centre Star is connected with the War Eagle mine on the 9th level.

Electric power was substituted, 1906, for steam. Equipment includes a 52x56' engine-house with a 28x60" Nordberg hoist having drums of 10' diameter and 5' face, with hoisting capacity of 135 tons per hour from a depth of 3,000', using 4½-ton skips in balance, at a speed of 2,500' per minute. A 650-h. p. Westinghouse induction motor drives a 40-drill air-compressor, and there is a 24x36" Jenckes-Farrel crusher, with capacity to reduce 100 tons of ore per hour to 6" size.

The company employs about 400 men. Figures of production are not given out for the property individually, but output, 1904, was 77,892 tons of ore averaging 0.72% copper, 0.35 oz. silver and 0.3 oz. gold per ton, yielding 1,121,644 lbs. fine copper, and present production is larger.

CENTRE STAR MINING CO., LTD. **BRITISH COLUMBIA.**

Dead. Succeeded, January, 1906, by Centre Star Consolidated Mining Co. Formerly at Rossland, Trail district, B. C.

CENTURION ARIZONA MINING CO. **ARIZONA.**

Mine office: Willcox, Cochise Co., Ariz. Lands, circa 2 miles northwest of Dragoon station, are said to have a 17' vein carrying high grade cuprite, azurite and malachite, assaying up to 30% copper, opened to shallow depth only.

CENTURY DEVELOPMENT CO. **NORTH CAROLINA.**

Office: 52 Broadway, New York, N. Y. Mine office: Centre, Guilford Co., N. C. W. B. Feakins, president; Frank F. Hesse, secretary and treasurer; Chas. E. Dickens, superintendent. Organized under laws of Maine, with capitalization $300,000, shares $10 par; issued, $138,000. Bonds, $10,000 authorized, at 6%; issued, $5,000. Annual meeting, third Tuesday in December.

Lands, 92 acres, freehold, known as the North Carolina or Fentress mine, said to have produced considerable ore of 14 to 20% copper tenor previous to the American Civil War. Property shows 3 contact deposits, between granite and diorite, reported by company as of 7' average width, but otherwise stated as of 3' to 4' width, with outcrop traceable for 3 miles, having an ore chute of 80' to 90' in length, carrying auriferous chalcopyrite and pyrite, with quartz gangue, values being mainly in gold. Management reports average assays of 8% copper, 3 oz. silver and up to $12 gold per ton. Mine has shafts of 269', 80', 85', 303' and 175', and a 431' tunnel, with about 3,000' of workings. Property was opened circa 1840, closed 1856, reopened 1900. Has a 250-h. p. steam plant, with a 50-h. p. hoist and 10-drill air-compressor. Has 7 buildings, including a machine-shop, carpenter-shop, smithy, etc. Stampmill, 28x40', of mill has 10 stamps, built by the Mecklenburg Iron Works, and a Blake crusher. Company plans deepening the new incline shaft by 300'.

CENTURY MINING CO. **WYOMING.**

Dead. Formerly at Rambler, Carbon Co., Wyo.

CERMA DEVELOPMENT CO. **ARIZONA.**

Office: Calumet, Mich. Mine office: Ft. Huachuca, Cochise Co., Ariz. Organized, 1903, to develop a group of 47 claims in the Huachuca Mountains. Idle and apparently moribund.

COMPAÑIA EXPLOTADORA DE MINAS DE CERRO BLANCO. **CHILE.**

Office: Valparaiso, Chile. Mine office: Copiapó, Chile. Organized July 22, 1911, under laws of Chile, with capitalization 195,000 pesos, shares 130 pesos par.

COMPAÑIA MINERA DE CERRO BLANCO. **CHILE.**

Office: Valparaiso, Chile. Mine office: Copiapó, Atacama, Chile. Organ-

ized Feb. 14, 1900, under laws of Chile, with capitalization 150,000 shares 100 pesos par.

CERRO COLORADO MINING & MILLING CO. ARIZ

Office and mine: 82 Pennyton St., Tucson, Ariz. Daniel J. Sully, dent; Elias S. Gifford, vice-president; Chas. E. Udall, general manager. O ized 1905, with capitalization $5,000,000, shares $1 par. Lands, 72 cl unpatented, also 5 millsites, in the Cerro Colorado district, circa 45 miles Tucson, the nearest railroad point, including the old Silver Queen formerly a considerable producer of copper. Mine has a 520′ shaft, sho streaks of rich copper ore on the 350′ level, ore being mainly argentif tetrahedrite, with about 2,000′ of workings. Has a steam plant with 3 h air-compressor and 10 power drills. Property considered promising, handicapped by poor transportation facilities, though a little high grade has been shipped. Property attached for debt, August, 1908, and com apparently in a bad way.

CERRO COPPER CO., LTD. PE

Office: 21 Ironmonger Lane, London, E. C., Eng. H. J. Page, secret Organized Oct. 27, 1900, under laws of Great Britain, with capitaliza £101,000, shares £1 par; issued, £16,416. Has abandoned the copper prop formerly held in the Cerro de Pasco district of Perú.

COMPAÑIA MINERA CERRO DE LA GLORIA. CHI

Office: Santiago de Chile. Mine office: Caochapoal, O'Higgins, Chile. ganized Nov. 28, 1906, under laws of Chile, with capitalization 2,160, pesos, shares 25,000 pesos par.

CERRO DEL COBRE MINING CO. MEXI

Office: care of Dr. C. D. Warner, Coldwater, Mich. Letter returned f former mine office, Alamos, Sonora, Mex. Geo. L. Beach, secretary treasurer. Organized under laws of Arizona, with capitalization $10,000, shares $10 par. Lands, 435 acres, circa 9 miles from Alamos, having sev shallow shafts bottomed in ore, mainly sulphide. Property has been wor on a small scale for some years, furnishing considerable fluxing ores for duction of silver ores of the district, and also ore for production of a li copper used by natives for making domestic utensils. Test shipment of tons returned circa 20% copper, 1.7 oz. silver and $4.03 gold per ton.

COMPAÑIA SOCAVONERA DEL CERRO DE PASCO. PE

Mine office: Cerro de Pasco, Junín, Perú. Organized 1906, under law Perú, for the purpose of completing sundry old tunnels at Cerro de Pa and working the highly argentiferous copper ores of the oxidized zone of district.

SOCIEDAD CERRO DE PASCO. PE

Dead. Property taken over by Cerro de Pasco Mining Co. Formerly Cerro de Pasco, Junín, Perú.

CERRO DE PASCO MINING CO. PE

Office: 5-15 Broad St., New York, N. Y. Peruvian general office: L Perú. Mine office: Cerro de Pasco, Junín, Perú. Works office: La Fundi Tiñahuarca, Junín, Perú. Railway office: Oroya, Junín, Perú. Roscoe Channing, Jr., general manager; H. Esk Moller, treasurer; F. W. MacLen mine superintendent; S. J. Gormly, smelter superintendent; Frank Klep consulting engineer. Organized June 6, 1902, under laws of New Jersey, capitalization $10,000,000. Is closely connected with the Cerro de Pasco vestment Co. and the Cerro de Pasco Copper Co., and is controlled by B. Haggin, J. Pierpont Morgan, D. O. Mills, H. McK. Twombly and o wealthy residents of New York. Owns entire stock issue of the Cerr Pasco Railway Co., and entire stock issue of Sociedad Minera Copay-Co

and entire stock issue, excepting founders' shares, is owned by Cerro de Pasco Investment Co.

Lands, 941 claims, and 70,000 acres miscellaneous lands, including copper claims in the Morococha and Yauli districts, and about 400 acres of land that includes three-fourths of the rich Cerro de Pasco district, with a smelter site and extensive coal tracts north of Cerro de Pasco.

Cerro de Pasco lies 14,300′ above sea-level, rendering physical labor very fatiguing. The population of the town is about 15,000. The surrounding country is bleak, and all food and supplies must be brought in from considerable distances. The year is divided into two periods, the wet and dry, the wet season being from November to April. The summers are not hot, owing to the great altitude, and the winters are not cold, owing to the low latitude. Snow and hail fall at any time, summer or winter, but rarely remain on the ground as long as 48 hours, even in winter. The fluctuation between mean summer and winter temperatures is about 20° Fahrenheit, only.

Silver was discovered at Cerro de Pasco A. D. 1630, and the production of the district, to the close of the Nineteenth Century, is estimated at 450,000,000 ounces, secured from about 40,000,000 tons of silver and copper ore, nearly all extracted by hand labor, and carried 3 to 6 miles on the backs of llamas, to primitive smelters, whence the silver bullion was transported, by llamas, 200 miles to Lima, until circa 1870, when a railroad was completed to Oroya. Formerly only the richest copper ores were worked, ore shipped ranging 25 to 40% in copper tenor, after careful hand selection.

Authorities disagree hopelessly as to the geology of the district, but in an area approximately one mile wide and nearly 2 miles in length, there is ore on nearly every claim, proving Cerro de Pasco one of the richest mineral fields of the globe. Ore bodies outcrop prominently, as crestones, or ridges, and carry gold, silver, copper, galena, zinc and cobalt. The oxidized zone carries considerable gold, running as high as 1 to 2 oz. per ton, occurring in rich but narrow chutes. The high silver values usually extend to about 100′ depth only, occasionally running up to thousands of ounces per ton, in decomposed quartz, followed by highly argentiferous copper ores, which, in turn, at a little greater depth, are succeeded by ores low in silver, but richer in copper, all of the copper ores being more or less argentiferous, being estimated to have averaged 15 to 25 oz. per ton in the old workings. Primary ores below the water level are bornite and chalcopyrite, associated with pyrite, tetrahedrite, arsenopyrite and sphalerite, containing little silver and only traces of gold. There are occasional veins of high grade silver-lead ores, and occasional sphalerite up to 8% in zinc tenor, but not enough to give any particular trouble. Practically all of the copper ores are bismuthiferous, hence refractory in reduction. The ores carry about 25% silica and 14 to 30% iron, the excess of silica requiring considerable limestone for fluxing.

The property of the Cerro de Pasco company includes hundreds of old mine workings, some opened to 300′ depth, though the majority are under 100′. The surface of the property shows scores of tajos, big pits resulting from the caving in of old open-cast workings, some of these being nearly or quite 300′ deep. The property lies in a basin, and the mines are very wet, especially below a depth of 400′, but unwatering by tunnel is impracticable, unless by a very long drainage tunnel. There have been three attempts at drainage tunnels, the only one of importance having been the Rumaillana tunnel, begun 1887, by Henry Meiggs, and discontinued, because of his death, at a distance of 1,000′. Meiggs held a concession from the Peruvian government for 25% of the gross values extracted by mines drained through this tunnel, which concession passed later to a company that cleaned out the old workings and drove the tunnel to a length of 1,466′. There is a possibility of

litigation between the Cerro de Pasco and the owners of this tunnel, in case the work is completed.

The company has disregarded the hundreds of old workings, except as throwing light upon the geology of the district, and has opened a new mine by 2 tunnels, of about 2 miles length each, and by 5 new shafts, these being the Diamante 2-compartment shaft of 400′; the Peña Blanca 2-compartment shaft of 400′; the Carmen 2-compartment shaft of 450′, and the Noruega 2-compartment shaft of 350′, all 4 shafts being connected. The 4-compartment Esperanza shaft is planned to do the hoisting for the entire mine, and is to have steel headgear and electric hoists, with shops and power plant grouped near by. Waste is used for filling, timber being very expensive, and used only for lining shafts and timbering important tunnels. The mines are equipped with powerful pumps. Estimates of ore in sight vary from 2,000,000 to 75,000,000 tons, the latter figure being ridiculously excessive, and not countenanced by the management, but there unquestionably are large reserves of ore blocked out, these including first grade ore of 8 to 10% copper tenor, with good silver values; second grade ore of 5 to 6% copper tenor, with fair silver values, and low grade ore of uncertain copper tenor, though probably workable, in the main.

In addition to the regular mining work, considerable prospecting has been done, and many diamond drill borings have been made, adjoining the main tract of the Cerro de Pasco and in the adjoining coal fields.

The reduction works, at La Fundicion, near Tiñahuarca, 9 miles from the mines, are connected therewith by rail. All buildings are of steel frame covered with corrugated iron. The plant treats a small quantity of custom ores, and has a sampling mill with crushers, rolls and chain-bucket elevators. The works are terraced throughout, permitting the handling of material by gravity, and are built on the unit plan, so that their capacity may be doubled, or, if desired, quadrupled, at later date.

The furnace building has twelve 2,000-ton flat bottomed steel ore-bins with lining of double thickness of 2″ plank, being filled from railroad tracks above, and loading into charging cars run alongside. Charge cars are drawn by small locomotives, on a narrow-gauge track running on either side of each furnace, 2 cars constituting a charge. There are four 56x180″ water-jacket blast-furnaces, with brick-lined hearths and crucibles, discharging into five 16′ settlers. The furnaces, in October, 1908, were treating an aggregate of 600 tons of ore per day, but are of about 300 tons actual daily capacity each. Slag is granulated by running water. The smelter building has a steel stack, 220′ high and 20′ in diameter. There is one reverberatory furnace, and 5 additional reverberatories are to be in operation, early 1909. There are two 18′ six-hearth McDougal calcining furnaces, and 8 are to be added early 1909. It is also planned to build a new dust-flue, dust-chamber and a 2[illegible] steel stack.

The converter department, in a separate building, has 4 stands, with twelve 84x180″ shells, and 3 stands are to be added, early 1909. The converter, of the upright pattern, is tilted hydraulically, and blister copper poured into moulds on a low car under the converter stand, cars being shifted hydraulically. The converter slags pour into ladles, and thence into iron moulds, slags being crushed in 2 slag mills and discharged into bucket elevators, going to a storage bin on the feed-floor, for resmelting. The converter department has quartz mills for linings, and 2 large storage bins for material. Product of the converter is 99% blister copper, in cakes, shipped for refining to Baltimore.

The power plant includes a boiler-house with sixteen 250-h. p. Babcock & Willcox boilers, an engine-house having a 600-h. p. Nordberg cross-compound

irect-connected to a 440-kw. Westinghouse generator, two 475-h. p. engines direct-connected to two 250-kw. generators, a 750-kw. West- alternator and dynamo, and 2 smaller dynamos furnishing electric l light. There are 3 No. 11 Connersville blowers, driven by a Nord- -compound engine, a large Nordberg air-compressor for converter an air-compressor for the pneumatic operation of furnace doors, etc. r plant was practically duplicated, 1908, as a precaution against

llaneous buildings at the works include an iron foundry with a ola and overhead electric traveling crane, patterns shops, 100x300' machine shop, carpenter shop, smithy, laboratory, office building ngs for employes.

ltitude of the smelter is 14,300', and ores being refractory and icient, no little trouble was experienced in the earlier stages, but ties encountered at the beginning have been overcome, gradually, end of 1908 the works were giving fairly satisfactory service, with pect of still better work in 1909.

mpany furnishes its own fuel, owning extensive beds of bituminous ther indifferent average quality, though with some coal of coking e principal coal mines are located at Goyllarisquisca, Quishuarcancha cancha. A 21-mile branch line of the railway terminates at Goyllar- e Vincuscancha coal mine being about midway, and it is proposed to erial tram to connect with the Quishuarcancha, at present accessible gons and pack animals. There are large reserves of coal of fair qual- llarisquisca and Quishuarcancha, and production, at the end of 1908, 700 tons daily, of which 200 tons were used raw at the mines and lroad, 500 tons going to the coal washers near the smelter, the oduct being used for steam purposes and for coking. The coke the smelter, has seventy 75-ton beehive ovens, making a satisfactory blast-furnace use, no coke being imported. The coal contains 50 ed carbon, 20% volatile matter and about 13% ash, with consid- phur disseminated throughout. The company's brick plant has important success, as imported brick of all kinds are very costly, cal plant is turning out fire and silica brick of very fine quality, found in the mines, and common building brick are made from a ar the Vincuscancha mine. This plant will begin the manufacture of le pipe, in 1909.

estone quarry, 12 miles from the works, furnishes fluxing material, ompany also has a silica quarry, for material required in lining shells.

Cerro de Pasco railway, owned by the company, operates under a t concession, the main line of 83 miles running from Cerro de Oroya, where connection is made with the Central Railway of Perú, 130 miles to Callao, the latter line being one of the most notable rld, having cost $43,000,000, and gaining nearly 3 miles vertical reaching the highest altitude of any railroad on the globe, after g almost incredible obstacles, having an average grade of 2.5%, less than 57 tunnels, including the Galera tunnel of 1 kilometer ith cuts through a ridge of the Andes. The Cerro de Pasco rail- 21-mile branch to the coal fields, and, with all spurs, sidings and about 125 miles of track; of standard gauge. The main line has grade of 1.5%, with a maximum grade of 3%, and cost upwards 000. Equipment includes 13 locomotives, in addition to 6 light engines at the smelter, and 59 steel ore and coal gondolas, with 247 forty-ton cars, rolling stock being of the best American manu-

facture. The railroad is on a paying basis. The Peruvian gove
said, 1908, to have awarded, to Albert McCune, a contract for the
of the Cerro de Pasco & Ucayali railroad, to open a district sup
immensely rich in minerals.

The company has built expensive and thoroughly comfort
club-houses and dwellings for its employes, and has furnished f
riding and hunting, and in consequence no longer has difficulty
and retaining competent mining and smelting men, many of whon
families with them. Although the altitude is high, any perso
good health need have no fear of ability to live comfortably in
air of Cerro de Pasco. Wages range $2.50 to $4 per day for whit
60 to 75 cents per day for native labor, the latter being tractal
some purposes, fairly efficient. The company employs a total for
6,000 men.

The Cerro de Pasco undoubtedly is the most expensive copper
ever developed, and the total investment is said to be, to
$23,000,000. Production, 1906, was 3,389,787 lbs., and 1907 was 20
fine copper, while for 1908 the output was circa 30,000,000 lbs., a
should be nearly or quite 45,000,000 lbs. The management is
and capable, and its courage and financial resources have been d
by the tremendous investment made. There were many discoura
in the earlier stages, but in the main these have been overcome,
and while there are some problems remaining, the progress al
warrants the expectation that all difficulties will be met and con
property is one of vast possibilities, and the prediction of an ulti
production of 100,000,000 lbs. fine copper seems warranted, though
will be required to reach this figure.

CERRO DE PASCO TUNNEL & MINING CO.

Office: 45 Wall St., New York, N. Y. Mine office: Cerro de P
Perú. Eleanor Rawls-Reader, president and general manager; Chas
vice-president; H. H. Leahy, secretary and treasurer; preceding
B. Rawls-Reader, Fred Tate and S. G. Harris, directors; Carroll
consulting engineer; Jos. E. Chastaine, assistant secretary. Org
8, 1902, under laws of Maine, with capitalization $2,000,000, sh
half in 7% cumulative preferred and half in common stock. Ann
third Monday in January. Management paid a 7% dividend, 1
ferred stock, money for which probably came from stock sales. C
Copper Basin Mining & Smelting Co., of Nevada, which lost it
is worthless, through ownership of majority of stock. Peruvian
groups, area circa 2,000 acres, about half in the Yauli district
the Acari district, also the Rumaillana or Meiggs tunnel, in t
Pasco district. Tunnel, begun 1877, is 3 meters wide and 2.75
of 2,800 meters projected length, of which only about 270 meter
pleted in 1900. Tunnel concessions carried rights to 20% of all
tracted by various owners of mines drained, and 40% of all miner
by tunnel-owners. Company was promoted by Eleanor Rawls-Re
largely exploited in the press, and at last accounts, Oct. 5, 19
was endeavoring to collect, by legal proceedings, $195 for 3 month
rent. Is not regarded favorably.

MINA CERRO DO GARALDO.

Mine office: Cacapava, Rio Grande do Sul, Brazil. Lands,
northeast of Cacapava, show ore outcropping at the summit of
slightly developed by 6 very shallow shafts, bottomed in micha-sc
nated with chalcocite.

CERRO MARTINO. **BRAZIL.**

ine office: Cerro Martino, Rio Grande do Sul, Brazil. Property, located lometers from Rio Negro station, and 130 kilometers from Cachoeira, Uruguayana railway, shows conditions somewhat similar to those at maquam mine, but melaphyr is much more in evidence, with much less erate, latter shading into coarse sandstone, with dip of about 40°, ossing these at approximately right angles. Copper occurs mainly as te, with gangue of pyrite and heavy spar, assaying 17 to 25% copper.

MURIANO MINES, LTD. **SPAIN.**

e: 9 Queen Street Place, London, E. C., Eng. Mine office: Mauriques ba, Sevilla, Spain. Wm. Frecheville, chairman; John Taylor & Sons, ; Richard Eshott Carr, agent; Henry F. Collins, superintendent; F. ams, secretary; Jos. Tamblyn, mining captain. Organized May 7, der laws of Great Britain, and capitalization increased, 1905, to shares £1 par. Debentures, £25,000, at 6%. Company holds a con- share interest in the North Cerro Muriano Copper Mines, Ltd.

s, 314 hectares, in the districts of Córdoba and Obejo, held under lease from the State, also various leasehold tracts. Property shows d mines, which were worked during the era of Roman domination, h of at least 400′, notwithstanding their wetness. Property shows d several small fissure veins in micaceous schists, diorite and quartz- ing chalcopyrite and iron pyrites, with a gangue of calcite, quartz, country rock. Veins have widths of 1′ to 40′, with following proven Calavera, 1,635′; Excelsior, 635′; Lorenzo, 4,575′; Isabel, 5,550′; riano, 8,500′. Some ore taken from old Roman workings has assayed copper.

shafts are the Santa Victoria, bottomed in the footwall at 726′, San Rafael, 917′ deep, and very wet, which intersected the vein at 870′. The San Rafael shaft, 300 meters from the Santa Victoria, vein of 5 to 13 meters width, with better portions worked out by ns, in the upper part of the mine. The San Rafael has a Haw- ey Cornish pump, with 54″ high-pressure cylinder having a 96″ d 94″ low-pressure cylinder with a 16′ stroke, calculated to operate th of 1,580′. The San Guillermo shaft, 300 meters from the San spended sinking at 42′ depth.

ce equipment includes 3 hoists and a 10-drill Walker air-compressor. erved by the Ferrocaril Andaluces. This is one of the largest and eting of the old Hispano-Roman mines, and was famous, before an era, for the high quality of copper and brass produced from its was entirely idle for nearly 2,000 years, until reopened by the present The mine employs circa 150 men, and shows reserves of about 25,000 ore, blocked out. A small smelter is being built.

A MINERA CERRO VERDE, S. A. **MEXICO.**

e Mexican incorporation of the San Xavier Copper Co.

N COPPER MINING CO. **WYOMING.**

Rawlins, Wyo. Mine office: Copperton, Carbon Co., Wyo. O. , president and general manager; H. O. Granberg, vice-president; berg, secretary; G. O. Gilbert, treasurer; preceding officers and Henry directors. Organized July 21, 1906, under laws of Wyoming, with $1,000,000, shares $1 par; issued, $631,000. Lands 6 claims, patents applied for, in the Battle Lake district, showing contact Limestone and quartz, opened by seven 10′ pits and shafts of 45′. Idle.

SUCESION CERVERÓ. **CH**

Mine offices: Los Marquis, La Ligua, Aconcagua, Chile, and Ñipa Ligua, Aconcagua, Chile. Works office: Cabildo, La Ligua, Aconcagua, C The Padres and Fraguas mines adjoin the Marquis mine of Otto Harne and are similar in characteristics of ores. Greatest vertical depth is meters, with extreme length of horizontal workings of about 200 meters. Mina Maria, at Los Mercedes, 16 kilometers from Cabildo, has a vei granite, ranging up to 15′ in width, with strike of 50° West, and dip of carrying auriferous and cupriferous pyrite, with quartz gangue, ore avera about 4% copper and 40 grams gold per ton. The Mina Montoya, op 1855, has a 900′ tunnel, opening a 15′ vein in porphyry, carrying argentife sulphides with calcite gangue. The Ñipa properties, 16 kilometers Cabildo, includes the Castillo, Quisco and Cuevas mines, having an ext depth of 350 meters, with extreme length of horizontal workings of 800 me The mines at Los Marquis produce 6% ore and the Ñipa mines make a production of selected ore averaging 25% copper, after discarding quantities of ore of about 4% tenor, suitable for concentration later. Ave of all ores treated is about 5% copper.

The smelter, at Cabildo, the terminal of the Calera & La Ligua railv does a general custom business, about one-third of the ore smelted being duced by the mines of the firm. The old smelter had a number of reverberatories, which have been replaced by 42″ and 48″ circular water-ja blast-furnaces, making ejes of about 45% copper tenor, 10% of which ca 250 grams of silver and 75 grams gold per metric ton. Fuel is mainly En and German coke, with some domestic coal and wood, 1 ton of imported being required for smelting 8 tons of ore, slags averaging 0.4% co Employs circa 100 miners and 50 smeltermen, latter at average wages of pesos daily. Production, 1903, was 923,458 lbs. fine copper.

CHAFFEE GOLD & COPPER MINING CO. **COLORADO & WYOMI**

Mine offices: Black Hawk, Gilpin Co., Colo., and Tie Siding, Albany Wyo. S. N. Cravens, president; G. W. Doverspike, vice-president; H. McClellan, secretary and treasurer. Organized September, 1901, with cap ization $100,000, shares 10 cents par. Said to be out of debt, but wit funds. Lands, 5 acres, known as the Telephone claim, 1¼ miles from B Hawk, opened by a 100′ tunnel, said to show a 6′ vein, also 80 acre copper lands, undeveloped, near Tie Siding.

CHAINMAN CONSOLIDATED COPPER CO. **NEVA**

Office: 25 Broad St., New York, N. Y. Mine office: Ely, White Co., Nev. J. Berry, president and treasurer; L. A. Burleigh, clerk; W. McGill, general manager; Geo. E. Gunn, consulting engineer. Organized under laws of Maine, with capitalization $5,000,000, taking over prop of the Chainman Mining & Electric Co. Was promoted by W. B. Thomp Lands, apparently 6 claims, area circa 120 acres, mainly patented. Mine opened, 1869, for gold, but values turned into copper in lower worki Old mine has a 300′ shaft, with about 1 mile of workings, showing per 200,000 tons of auriferous iron ore carrying some silver. There is an imm surface showing of iron oxides, carrying $1.50 to $10 gold per ton, which sh be underlaid by large bodies of copper ore. Iron ore will be valuable for flu especially as it contains fair average gold values. It is planned to aba the old Chainman shaft, and 2 new shafts, the Chamberlain, 200′, and Aultman, have been sunk. Has a 200-ton mill, with cyanide plant, production of gold has been hampered by increasing copper values. property of much promise.

AN MINING & ELECTRIC CO. **NEVADA.**
Succeeded, circa 1906, by Chainman Consolidated Copper Co. For-
Ely, White Pine Co., Nev.

IA BENEFICIADORA DE MINERALES **MEXICO.**
HALCHIHUITES, S. A.
Mexican incorporation of the National Smelting Co. Theo. Mont-
president; Adolfo Trauwitz, secretary; Paul W. Meyer, treasurer.
tion, 250,000 pesos, shares 50 pesos par.

IHUITES MINES CO. **MEXICO.**
288 Garside St., Newark, N. J. Mine office: Chalchihuites, Zac-
ex. Edw. H. Jones, president; C. C. Hamer, secretary; B. W. Farris,
anager. Lands, 192 hectares, including the San Nicholás mine, carry-
of gold, silver, copper and lead. Is opened by shaft and equipped
m power.

NGE MINE. **MICHIGAN.**
d by St. Mary's Mineral Land Co.

ERS MINE. **MONTANA.**
d by Washoe Copper Co.

ON COPPER CO. **MICHIGAN.**
82 Devonshire St., Boston, Mass. Mine office: Painesdale, Hough-
Mich. Mill office: Redridge, Houghton Co., Mich. Wm. A. Paine,
; Chas. J. Paine, Jr., vice-president; preceding officers, Geo. P. Gard-
, H. Paine, Nathaniel H. Stone, Hon. Richard Olney and Saml. L.
rectors; Frederic L. Stanwood, secretary and treasurer; F. W. Denton,
anager; John Jolly, underground superintendent; F. G. Coggin, mill
ndent; R. H. Leach, assistant mill superintendent; H. F. Mercer, chief
M. J. Harrington, chief clerk; Richard Trevarrow, mining captain;
mpbell, master mechanic; Mark Cunningham, superintendent motive

nized December, 1899, under laws of Michigan, with capitalization
), shares $10 par. Owns $44,000 stock of the Michigan Smelting Co.
ock issue is owned, in equal parts, by Copper Range Consolidated Co.
Mary's Mineral Land Co. Dividends have been as follows: $300,000
$200,000 in 1904; $1,000,000 in 1905; $1,200,000 in 1906; $1,000,000
Two dividends, of $1 each, were declared Apr. 24, 1908. Net earn-
, were $976,770.87 and 1907 were $909,383.88, in addition to expendi-
$446,373.81 for construction. Company ended 1907 with a surplus of
11.

s, 1,240 acres, being the south half of Section 30; west half and north
ortheast quarter and southwest quarter of northeast quarter of Section
54 North, Range 34 West; southeast quarter of Section 25 and east
Section 36, Town 54 North, Range 35 West, practically all on the
elt. Neighbors of the Champion are the Copper Range and Trimount-
he north, lands of St. Mary's company and Hussey, Howe & Co. on
Hussey-Howe lands and the Globe tract on the south, and Copper
nds on the west. The tract gives a distance of 9,047' on the strike of
and at the present angle of dip, the deepest shaft could go down
efore reaching the company's boundary line on the west.
lopment was begun in 1899, under direction of Dr. L. L. Hubbard, and
amygdaloids were uncovered by trenching, one of which, the Baltic
ed phenomenal copper values. The two amygdaloids paralleling the
e show copper in sufficient quantities to render their future explora
able. A fourth amygdaloid, about 15' wide, discovered 1901, east of
lode, carries heavy copper to a promising extent, and there also is a

fissure vein of arsenical ore, apparently algodonite, near C shaft. The wi of this vein at surface is slight, and mineral contents variable, but on second level the fissure is 2′ wide and well mineralized.

The dip of the Baltic bed at the Champion is circa 70°, with about same strike as at the Trimountain, rather than the exaggerated easterly tr noted at the Baltic mine. The bed runs 13′ to 45′ and averages 24′ wid carrying more epidote than at the Trimountain and Baltic. The surface of tract is very hilly, but the overburden is less than is found either to the nor ward or southward. The stretches of lean ground in the mine are few, and lode carries heavy copper in profusion, mostly in barrel size, but running up masses of 10 tons in weight.

The Champion mine is developed by 4 shafts, numbered from north south, with room for 3 additional shafts.

A shaft is merely a site, there being no development.

B shaft, the northernmost, is 1,835′ south of the Trimountain boundar with collar 635′ above mean water datum of Lake Superior, and, Jan. 1, 19 was 1,300′ deep.

C shaft, 1,050′ south of B, is 1,616′ above the lake and Jan. 1, 1908, w 1,300′ deep.

D shaft, 1,300′ south of C, is 631′ above the lake, and Jan. 1, 1908, w 1,400′ deep.

E shaft, 1,300′ south of B and 3,900′ north of the Globe boundary, w 1,475′ deep on Jan. 1, 1908. The third level of E shaft had been driven 3,0 to the southward to the Globe mine, September, 1908.

F shaft, started 1,300′ south of B, was abandoned on account of treache ous overburden, but the Baltic bed was located, 1907, by diamond drill, at new site, circa 1,800′ south of E, and 2,100′ north of the Globe boundary.

G shaft is merely a site for a shaft, near the Globe mine, on which work has been done.

All of the shafts are connected on numerous levels, and the mine h about 11 miles of lateral workings. The Baltic lode shows so little p ground in the Champion that it is probable that eventually nearly every le will be opened from end to end of the mine, giving the longest average dri of any Lake Superior property. The only really poor ground in the mine w shown in E shaft, between the 3d and 4th levels, below which the mineral tion is regular and satisfactory. The mine shows some stopes of phenome width and richness. Dry-walling is used extensively, greatly reducing the c of timbering.

The shafts are practically duplicates in all essential particulars, hav 40x50′ shaft-rockhouses, with 90-ton ore-bins, enlarged, 1908, by the Wisco Bridge & Iron Co. Equipment at each rockhouse includes a steam-hammer heavy copper, and one 12x15″ rock crusher, taking everything hoisted f the mine, direct from chutes. Initial equipment at the 4 shafts inclu second-motion Nordberg hoists, good for about 1,500′ depth each, but all sh have been equipped with new hoists, which are duplicates, these being fi motion Nordbergs with 24x60″ duplex cylinders and double conical drums 14′ diameter, with capacity for two 3,000′ cables each, hoisting 6-ton sk The engine-houses are of redstone, or mine rock with redstone trimmings, boiler-houses adjoining having Bradley and Burt boilers, with coal trest connecting. Water for boilers is furnished from a 12,000,000-gallon dam, from hardpan foundation to crest, with a cement core 5′ wide at the bot and 2′ at the top, reinforced by rock.

Very extensive use is made of electric power on surface, and there some underground electric pumps. The electric plant at F shaft has a 250-k

lectric generator, direct-connected to an Allis-Chalmers cross-com-
ical engine.

ain compressor building, at F shaft, of steel, has a 100-drill Nord-
ruple expansion two-stage air-compressor, with capacity to compress
t feet of free air per minute to a pressure of 70 lbs. per inch. The
operates at a steam pressure of 280 lbs. and has a regenerative feed-
em. Power is furnished by three 250-h. p. Geary water-tube boilers.
t is a 40-drill Ingersoll-Sergeant cross-compound two-stage air-com-
ith vertical receiver intercooler. The electric plant, with a 100-kw.
is in the main compressor building.

ngs at the mine include a 60x145' machine-shop, of sandstone, with
having a traveling crane and trolley rail for the entire length, with
electric motor. Adjoining the machine-shop is a 50x128' smithy,
e, having a trolley rail, for handling forgings, running the entire
the shop. The machine-shop and smithy have railroad tracks,
with the Copper Range railroad. The 32x60' carpenter-shop is of
iron siding and roof.

llaneous structures include a good office building, 2 changing houses,
s, stables, 3 large boarding-houses and about 250 substantial dwell-
ed in the attractive townsite of Painesdale, which, in addition to
ny's buildings, has a fine schoolhouse, hotels and various business
so the Sarah Sargeant Paine memorial library, a handsome redstone
costing $30,000, erected by Wm. A. Paine as a memorial to his
ich is much appreciated by the employes.

ater system, serving the mine and town jointly, has a 1,000,000-gallon
mp, at Lake Perreault, 4½ miles distant, distributing water to the
n a 200,000-gallon steel stand-pipe, on high ground, near the mine.
ompany has an automatic telephone system, with about 40 instru-
necting the principal buildings and a number of pump stations under-

tampmill, at Freda, on Lake Superior, 2 miles west of Redridge, is
f steel and concrete, built by the Wisconsin Bridge & Iron Co. The
ally had 4 Nordberg stamps, each with a 15' concrete foundation,
dition, built 1905, was used first for new crushing machinery, but 2
e added, 1908, in place of an experimental graded crushing plant
tory crushers instead of stamps, operated 2 years, which system was
in Vol. VII. The 4 heads in the original mill were cross-compounded
, but were changed back to simple heads in 1906. Theoretically the
ounding was an advantage, but practically the experiment was
ful. If all four heads could be operated simultaneously and regularly,
ounding would effect a considerable saving in fuel cost, but in
mill practice it is found preferable to have each stamping unit inde-

wash for the heads has Hodge graduated adjustable-speed jigs, with
working simultaneously or alternately, in pairs, Woodbury jigs and
concentrating tables. Raggings are reground by Allis-Chalmers
rolls, having one roll in a fixed bearing and the other in a spring.
The preliminary discharge from the stamp-heads is treated on very
, having 30x48" sieves, of punched steel, with ⅛" openings, installed
tion with the head. Experiments with settling tanks having proven
, an extensive series of settlers has been installed, each head having 6
h 40' long, 9' deep and of "V" shape, 12' wide at the top and 6"
he bottom, slimes being drawn from spigots at the bottom to the
ors. The flow of the water through the settling tanks does not

exceed 6′ per minute. Tailings losses were about 0.28% copper, but the n settlers are expected to bring the losses down to 0.24%, or even less.

The mill is heated by hot water from a Green fuel economizer, piped 300° to 350° F. to a steel-clad chamber, whence heated air is drawn into du by a Sturtevant blower, and distributed through the mills, water being pump back to the economizers and thence fed to the boilers.

The steel boiler-house has four 200-h. p. Stirling boilers, 5 Dutch Ov Scotch marine boilers, and 2 Hawley down-draft furnaces. Automatic stoke were tried, but discarded. Coal is brought to the boilers by tram, and reduce to uniform size by a grinder, before feeding to the grates, and ashes a washed into the lake through a launder, by jets of water. Exhaust ste passes through dry condensers, thence to a hot-well, from which water is fed t the boilers. Power for the mill is supplied by a 500-h. p. Nordberg cross-co pound engine, having 14″ and 32″ cylinders, with 30″ stroke, a 180-h. p. engin formerly used for the 4-head mill being held in reserve.

The 40x60′ steel pumphouse, with truss roof and traveling crane, has 20,000,000-gallon Nordberg triple-expansion pump. Water for the mill a boilers comes from the lake through a 1,020′ tunnel, the shore end havin a well with bottom 8′ lower than the lake level, this being the longest tunn ever driven under Lake Superior. The intake crib has an area of 45 squar feet, and, with a second crib, the tunnel could furnish water for 8 to 10 stamp Water cost is less than 1½ cents per ton of rock stamped. Screens have bee installed in the tunnel, obviating the trouble formerly caused by sand an wood-pulp in the water.

The mill plant includes a machine-shop, carpenter-shop, smithy, warehou office, laboratory and about 20 dwellings. There is a water system, wit mains and hydrants and a fire pump, and the works have a private telepho system.

The mine is working about 80 power drills, and about 1,200 men are em ployed at the mine and mill.

Production of fine copper has been as follows: 10,564,147 lbs. in 190 12,212,954 lbs. in 1904; 15,707,426 lbs. in 1905; 16,954,986 lbs. in 1906; 16,489,4 lbs. in 1907. Mineral returns are 30 to 33 lbs. per ton, assaying about 73% fin copper, equivalent to circa 23 lbs. fine copper per ton. Rock stamped, 190 was 708,685 tons, and yield of refined copper was 23.25 lbs. per ton, or 1.16 placing the Champion second only to the Wolverine among the amygdaloi mines of Lake Superior in richness of its rock. Cost per ton of rock treate including taxes, was $1.78, and cost of finished copper, delivered, includi taxes, was 9.05 cents per pound. The Champion is one of the largest an richest of Lake Superior mines, and has been admirably managed from t beginning. The mine has by no means reached its ultimate limit of outpu and is capable, with the present mining and milling equipment, of producin nearly or quite 25,000,000 lbs. fine copper yearly.

CHAMPION COPPER MINING CO. IDAH

Mine office: Wallace, Idaho. Letter returned unclaimed from former min office, Mullan, Shoshone Co., Idaho. Adam O'Donnell, president and manage Lands, just east of the Park mine, on the southern slope of Stevens Peak, miles south of Mullan, have 2 crosscut tunnels, longest 600′. Property said to show a mineralized zone of 75′ to 100′ width, with a vein ranging s to 25′, carrying chalcopyrite and occasional bornite, assaying up to 30% copp with an average of about 5%, with quartz and calcite gangue. Idle and a parently moribund.

CHAMPION GOLD & COPPER MINING CO.

Office: California Blk., Tacoma, Wash. Location of lands, if any, u known. Apparently moribund.

of ore smelted in reverberatories at an average cost of 14.21 pesos ton, and 16,165 tons or ore smelted in blast-furnaces, at an aver 10.01 pesos per metric ton. Ore averages 5.5% copper, but losses i through fumes, dust and slag, aggregate 1.2% copper, giving a net e only 4.48% copper by the old works.

Production, 1903, under former management, was 644,573 lbs. but for first fourteen months, under present management, Novemb December, 1907, inclusive, was circa 1,300 metric tons fine copper, a half 1908, company produced 102 to 120 metric tons fine copper mont erty is considered valuable and management good.

MINA LA CHAPARRITA.

Owned by Sociedad Nuestra Señora de la Salud.

CHARLEMONT COPPER CO. **MASSAC**

Dead. Formerly at Charlemont, Franklin Co., Mass.

CHARSLEY'S NATIVE STAR MINE. **AU**

Office: Herberton, Queensland, Australia. Mine office: Ori Queensland, Australia. E. C. Wright, secretary; T. Bermingham, mi Employed 13 men, on development work, in 1907.

CHARTER OAK COPPER MINES, LTD. **BRITISH C**

Office: 16 Victoria St., London, S. W., Eng. Sir H. Seton-Karr, T. Toten Willcox, secretary. Organized June 22, 1898, under law Britain, with capitalization £40,000, shares £1 par; issued, £28,957. 2 claims in British Columbia, and company sold 89 acres, in Carb Wyoming, 1908, to Copper Bar Mining Co. Idle for many years.

CHASE CREEK COPPER CO.

Mine office: Clifton, Graham Co., Ariz. Clarence K. McCornick, H. G. Smith, treasurer; S. S. Campbell, manager; I. N. Stevens, supe Capitalization $5,000,000. Lands, 52 claims, area 1,040 acres, cir west of Clifton, having a 1,750′ tunnel, 6x8′, on lands adjoining the mine, cutting the Longfellow ore body, of concentrating grade, at of 493′, having a back of about 900′, showing low grade sulphide Tunnel practically reaches the Coronado railroad, permitting ad shipments. Property considered promising.

CHATHAM COPPER CO. **NEW**

Dead. Formerly at Silver City, Grant Co., N. M. Described V

CHATTERTON MINING CO. **COLORADO & V**

Office 1101 Fisher Bldg., Chicago, Ills. Mine office: Pearl, L Colo. Was controlled, through stock ownership, by the National Milling Co., which moved from same office and left no forwardi Lands, 7 claims, area 125 acres, known as the Kurtz-Chatterton m Upper Platte district, opened by shafts of 30′, 35′ and 38′, and a 1,75 tunnel, said to show 7 veins of low grade sulphide ore traversi Widest vein, 7′, is said to have given average assay of about 5% c a trace of gold, ore being well adapted to concentration. Has a 5 and a 50-ton concentrator. Idle for several years. Is not regarded

CHATTERTON MINING CO.

Mine office: Tapalpa, Saynla, Jalisco, Mex. Samuel C. Brow manager. Mine, known as the San Antonio and extensions, said to bought for $100,000, carries auriferous copper ore with values main and has been a small producer in the past. Has a 10-stamp mill a trator.

CHAUTAUQUA MINING CO. **CAL**

Dead. Formerly at Manvel, San Bernardino Co., Cal.

CHELAN CONSOLIDATED COPPER CO. **WASH**

Office: 180 Broadway, N. Y. Mine office: Chelan, Chelan Co., W

Stillman, vice-president; Thos. J. Higgins, secretary and treasurer; officers, M. L. Blackburn and H. L. Fox, directors; M. J. Corcoran, ecretary and treasurer. Organized under laws of Washington, with ion $12,000,000, shares $12 par.

125 claims, area circa 2,500 acres, including 58 claims taken over North Star Mining Co., on Red Mountain, and 14 claims, area 280 ndex, Snohomish Co., Wash. Property was advertised by company ducing mines, which was untrue, and must have been known to be n the statement was made. Nearest railroad point is Leavenworth, utheast of Red Mountain, with a fair wagon road connecting.

ndex property, lying between the Ethel and Bunker Hill-Sullivan a 6′ vein, opened by tunnels of 600′ and 700′, with about 2,000′ of howing bornite and chalcopyrite, claimed to carry average values of , which is an overestimate, with small silver and lead values.

ny advertised, 1906, that there was no question that it would soon g and shipping no less than 1,000 tons of ore daily, and would pay dividends annually, which statements must have been prompted by or intent to deceive. Officers are said to be men of good standing, operty is considered of some promise, but the company is regarded ion, because of the ample evidence that some of its officers were ruthful in the promotion.

COPPER CO. **WASHINGTON.**

ffice: Chelan, Chelan Co., Wash. Said to own the Texas Jack copper Upper Horseshoe basin, Washington. Vein is claimed to be 30′ be- s, in places, with a paystreak of about 20″, carrying copper and es. Idle and apparently moribund.

TRANSPORTATION & SMELTING CO. **WASHINGTON.**

Formerly at Chelan, Chelan Co., Wash. Described Vol. VI.

US COPPER MINES, LTD. **BRITISH COLUMBIA.**

: 8 Broad Street Ave., London, E. C., Eng., and Vancouver, B. C. : Ladysmith, Vancouver Island, B. C. Samuel Erb, president; Chas. ger; preceding officers, C. J. Chapman, Robt. Larchin and Foster ectors; A. Hebden, London secretary; Robt. McCracken, Vancouver Henry Cecil, superintendent. Organized under laws of Great Britain, alization £200,000, shares £1 par. Lands, 241 acres, 2 miles from t & Nanaimo railway, known as the Victoria group, in the Bright ll timbered and having a 200′ waterfall available for delevopment of ine, opened by tunnel, has about 3,000′ of workings, and has been shallow pits and trenches, showing 3 fissure veins carrying 2 to 5 th a narrow paystreak of chalcocite and bornite ranging up to 3 tenor, high grade ores being both auriferous and argentiferous.

G COPPER CO. **NEW MEXI**

Wolvin Bldg., Duluth, Minn Mine office: Tyrone, Grant Co. N rill, managing director; preceding officer, John C. Oliver, Cam L. J. Crump, C. D. Frazer, Chester A. Congdon and Geo. F. Ba Organized May, 1907, under laws of Minnesota, with capital shares $10 par, as successor of Tyrone Development Co. ment Sept. 1, 1908.

, 3 groups, near the Burro Mountain, circa 12 miles y, including the Burro Chief group, area 237 acres Gulch, near the mine; the Mutual group, 16 claims luston group, 24 claims, area 469 acres, giving a 953 acres. Mine is opened by 6 shafts, all in ore, A. ep each, No. 2 being 500′ in depth, mine having el, eloping approximately 1,000,000 tons of ore,

copper tenor, with a small amount of high grade ore of 6 to 20% cop

Equipment includes a powerful pump, boilers, engines and air-co and a 1,000-ton concentrator is planned, with the expectation of putt 7 tons into one. Company employs circa 100 men, and management is Property is of much promise, and apparently should make a big low g

CHENIUS FALLS COPPER MINING CO. WASH

Mine office: Fairfax, Pierce Co., Wash. Organized July, 1902, talization $1,000,000. Lands, 2 claims, on the Chenius river, circa 7 Fairfax. Idle for some years.

CHEROKEE COPPER MINING CO. W

Dead. Formerly at Encampment, Carbon Co., Wyo.

CHERRY CREEK MINES CO. A

Mine office: Cherry, Yavapai Co., Ariz. H. A. Ingalls, super Main shaft, 115′, shows a vein with a 3′ paystreak giving assays 12.5% copper, 4 oz. silver and $9.60 gold per ton.

CHESTATEE MINE. G

Mine office: Villa Rica, Carroll Co., Ga. Property, 6 miles f Rica, has a bedded vein of cupriferous pyrite of 22′ to 30′ width, streaks on either wall, outcrops being traceable circa 2,000′. Ore average 3%, but probably averages about 1.5% in copper tenor o some years.

CHESTERFIELD COPPER CO. A

Office: 1001 Chestnut St., Philadelphia, Pa. Mine office: Tuc Co., Arizona. C. W. Savery, president; W. C. Lloyd, secretary and Col. Thos. Hughes, vice-president and general manager; Thos. Hu superintendent; preceding officers and I. W. Thompson, directors. April, 1907, under laws of Arizona, with capitalization $3,500,0 $1 par.

Lands, 22 claims, area 440 acres, including the Tiger and Cr groups, in the Pima district, 25 miles from the Twin Buttes railro erty has an 18″ vein of massive argentiferous galena, with a 2-co 80′ shaft and 10 pits showing copper sulphides.

CHETICAMP COPPER CO., LTD. NOVA

Office: 37 Sackville St., Halifax, N. S. Mine office: Cheticamp, Co., N. S. Edward Staris, president; John W. Regan, secretary and Milton V. Grandin, superintendent; W. H. Strachan, auditor. Organ 1904, under laws of Nova Scotia, with capitalization $3,000,000, par, as a merger of the Eastern National Copper Co., Ltd. and t corporations.

Lands, 950 acres, also a 200-acre mill and smelter site, 1,000 ac land, and 200 acres water frontage, with a government license for and locating mines on 50 square miles. Lands are freehold and paid

Property shows a mineralized zone, in micaceous schist, of width, traceable 1½ miles, carrying 4 ore bodies, of which 3 are by a 200′ shaft and by tunnels of 25′, 35′, and 115′, claimed by c show 250,000 tons of exclusively sulphide ore, averaging 2.5 to 3.5 18% lead, 30 oz. silver and $2 to $30 gold per ton. Nearest rail miles, but mine is 5 to 6 miles only from tidewater. Property promising, though estimates of tonnage and values are excessive.

CHETKO COPPER CO.

Office: Ashland, Ore. Mine office: Kerby, Josephine Co., Ore Evans, president and general manager; C. C. Hicks, vice-president intendent; A. E. Shepard, secretary and treasurer; J. M. Keith, min tendent. Organized, Aug. 10, 1905, under laws of Arizona, with capi $1,000,000, shares, $1 par; issued, $730,516.

nds, 36 claims, area 720 acres, fairly timbered, and 2 water rights, all y county, Oregon. Property shows 8 ore bodies, with 2 under develop- ne reported by company as of 240′ average width, traceable 1¼ miles, native copper in schist, also covellite, bornite and chalcopyrite, re- by company as of 9% average copper tenor, with $4.75 gold per ton. ment is by shafts of 45′, 34′ and 80′, and by 6 tunnels, of 30′ to gth, with 969′ of workings, estimated by company to show 600,000 ore, with 115,000 tons blocked out for stoping, which figures seem mploys 6 to 20 men. Company plans continuous development by tun- alling an air-compressor and building a 22-mile electric line from the Chetko Harbor, on the Pacific, which seems the only available outlet, nds are about 70 miles from Grants Pass, the nearest railroad point.

LAH COPPER CO. **WASHINGTON.**

e; Colville, Wash. Mine office: Chewelah, Stevens Co., Wash. F. A. president; F. H. McDermott, vice-president; L. E. Jesseph, secretary; mmond, treasurer; Benj. Bramley, manager. Organized 1907, under Washington, with capitalization $1,000,000, shares $1 par.

LAH COPPER KING MINING CO. **WASHINGTON.**

: 115 Wall St., Spokane, Wash. Mine office: Chewelah, Stevens h. J. Grier Long, president; H. H. Hebart, vice-president; S. P. ecretary and treasurer; preceding officers, J. W. McCabe and Walter weather, directors; John M. Long, general manager; Geo. H. Miller, erintendent. Organized 1893, under laws of Washington, with cap- $100,000, shares 10 cents par; issued, $797,000. Bonds, $30,000 l, at 8%; issued, $5,390.

s, 5 claims, area 100 acres, also an 8-acre millsite and 82 acres ous lands, showing 3 ore bodies, 2 of which have been developed by ain tunnel with circa 2,000′ of workings, showing a 30′ to 40′ vein auriferous and argentiferous copper sulphides, of about 2.5 to 3% nor and 6 to 12 oz. silver per ton, with small gold values. Trans- s, when working, to Chewelah, 4 miles, by 140-h. p. traction engine, to 10-ton loads, but plans a railroad spur and tram-line. Production, rted by company as 5,000 tons of ore, which probably carried about s. fine copper. Suspended operations November, 1907, on account al depression. Some of claims are said to have been jumped, 1907. ent stands well and property is considered promising, but company .

LAH COPPER MINING & SMELTING CO. **WASHINGTON.**

office: Chewelah, Stevens Co., Wash. W. H. Browlow, president ral manager. Lands, 7 claims, 2 fractional, known as the Alberta ened by 60′ and 100′ incline shafts, in sulphide ore averaging circa per, 2 oz. silver and $5 gold per ton. Mine is wet. Has a 250-h. p. an air-compressor. Plans sinking shafts to 500′ depth.

S MINING CO., LTD. **MEXICO.**

. Voluntarily liquidated, August, 1904. Formerly at Salto de Agua, Mex. Described Vol. V.

S ZONE EXPLORATION CO., LTD. **MEXICO.**

. Formerly at Pichucalco, Chiapas, Mex.

O-ALGOMA NICKEL CO. **ONTARIO.**

. Formerly at Sudbury, Algoma, Ont.

O-ALTA MINE. **MONTANA.**

office: Corbin, Jefferson Co., Mont. Was developing by tunnel, .

CHICAGO-BRITISH COLUMBIA MINING CO. BRITISH COLU

Dead. Formerly at Greenwood, Boundary district, B. C. D
Vol. VI.

CHICAGO COPPER CO. COLO

Mine office: Salida, Chaffee Co., Colo. Chas. Peck, manager, at
counts. Lands, 7 claims, showing ore said to give good assays. Idle.

CHICAGO COPPER MINING CO. NEW M

Mine office: Estey, Socorro Co., N. M. E. G. Rafferty, president
urer and general manager. Ira Chase, vice-president; T. C. Fenton, se
Organized Jan. 31, 1906, under laws of New Mexico, with capita
$1,000,000, shares $100 par. Lands, 22 unpatented claims, in the
Mountains, 18 miles from nearest railroad, and sundry real estate in t
of Oscuro. Former owners shipped several carloads of ore said
returned $270 per ton.

CHICAGO COPPER REFINING CO. ILL

Office: 310-138 Jackson Blvd., Chicago, Ills. Works office: Blue
Cook Co., Ills. W. G. Coolidge, president; F. A. Simmons, secretary
Foster, superintendent; Winthrop Coolidge, metallurgical superin
Property is a refinery, with small smelter of 40 tons daily capacity,
miscellaneous pig copper and by-products, making a specialty of copper
containing platinum, palladium and other rare metals. Has an elec
refinery with 100 tanks and two 60-kw. generators. Employs circa 100

CHICAGO DIXIE MINING CO. NE

Office: 81 Clark St., Chicago, Ills. Mine office: Letter returned un
from former mine office, Fallon, Churchill Co., Nev. Frank E. Wire, pr
H. R. Adams, first vice-president; H. L. Knott, second vice-president
Kreiss, secretary; Geo. V. Clementi, treasurer; R. W. Packard, superin
Organized Aug. 5, 1907, under laws of Nevada, with capitalization $2,
shares $1 par. Was promoted by the Chicago Promotion & Br
Co. Lands, 440 acres, in the Silver Mountains, about 60 miles from
having a 50′ shaft and short tunnel, showing ore assaying up to 3.83%
with fair gold and silver values. Idle.

CHICAGO & KOOTENAY MINING CO. BRITISH COL

Dead. Formerly at Nelson, Kootenay district, B. C.

CHICAGO-LA SAL GOLD & COPPER CO.

Dead. Formerly at La Sal, Grand Co., Utah.

CHICAGO-LA TOUCHE MINING & POWER CO. A

Office: 1 Board of Trade, Chicago, Ills. Mine office: Latouche, I
Island, Alaska. Robert Prindle, president; Walter Fitch, vice-presid
treasurer; Wm. E. O'Neil, secretary. Organized April, 1907, under
Maine, with capitalization $1,500,000. Property is 520 acres, carryi
water-rights, held under option, developed by about 900′ of tunnels.
about 20 men. Management considered good.

CHICAGO-MEXICAN CONSOLIDATED MINING CO. M

Dead. Formerly at Cusihuiriáchic, Iturbide, Chihuahua, Mex.

CHICAGO & MILWAUKEE COPPER MINING CO.

Mine office: Mullan, Shoshone Co., Idaho

CHICAGO MINING & MILLING CO.

Office: care of Fred T. McGurrin, secretary, Salt Lake City, Utah
Keeley, president. Organized 1904, with capitalization $150,000, sh
par. Lands include the Wild Bill group, in Beaver county, Utah. Idl

CHICAGO NICKEL CO. ON

Mine office: Worthington, Algoma, Ont. Lands are sundry pros
Drury township, showing nickel-copper ores. Idle and apparently mor

CHICAGO & PATAGONIA COPPER & GOLD MINING CO. **ARIZONA.**

Office: 97 Clark St., Chicago, Ills. Mine office: Nogales, Santa Cruz Co., Ariz. J. T. Brickwood, general manager. Organized January, 1904, with capitalization $250,000. Lands, known as the Old Soldier group, on the western slope of the Patagonia Mountains, east of the Santa Cruz river, have several shafts, deepest circa 225', with about 1,000' of workings.

CHICAGO-UTAH COPPER MINING CO. **UTAH.**

Mine office: Morgan, Morgan Co., Utah. Lands, 7 miles southeast of Morgan, in the northern Wasatch Mountains, slightly developed, are said to show, at depth of about 100', ore assaying 20% copper and 20 oz. silver per ton.

CHICAGO-VENTURE MINING CO. **WYOMING.**

Office and mine: Encampment, Carbon Co., Wyo. Robt. H. Young, president and general manager; S. A. McCoy, secretary and treasurer. Organized 1901, under laws of Wyoming, with capitalization $1,000,000, shares $1 par. Lands, 5 claims, patented, area 100 acres, showing 2 fissure veins in limestone, near a grano-diorite contact, of which one, averaging 15' width, is developed by shafts of 60' and 200', and tunnels of 50' and 60'. Idle since circa 1904, and apparently moribund.

CHICKAGAMOO MINING CO. **QUEBEC.**

Mine office: Roberval, Chicoutimi Co., Que. Peter McKenzie, general manager. Lands, apparently undeveloped, are in the Lake St. John region, about 165 miles north of Roberval, the nearest railroad point. Presumably idle.

CHICKAMUN COPPER-GOLD MINING CO. **WASHINGTON.**

Dead. Was merged in New Century Exploration & Investment Co. Formerly at Darrington, Snohomish Co., Wash.

CHIHUAHUA COPPER CO. **MEXICO.**

Office: 267 Central St., Lowell, Mass. Mine office: Moctezuma, Bravos, Chihuahua, Mex. C. M. Dickey, president; Joseph Jackson, vice-president; Clarence W. Hoyt, secretary and treasurer; Morris B. Parker, superintendent. Organized Nov. 9, 1905, under laws of Maine, with capitalization $600,000, shares $1 par. Annual meeting, second Tuesday in November.

Lands, 100 hectares, in the Sierra Mojena, 20 miles west of Moctezuma, showing numerous contact veins between limestone and porphyry, of which 4, undergoing development, range 2' to 40' in width, giving average assays of 8% copper, 3 oz. silver and $1 gold per ton, from cuprite, malachite, chalcopyrite and occasional chrysocolla. Has several shallow shafts, deepest 75', and 9 short tunnels, longest 120', with 650' of workings, estimated to show 2,500 tons of ore. Has a 25-h. p. hoist, good for 500', small Gardner air-compressor, and necessary mine building. Property was a small producer in the past, but was tied up by litigation for some time, before secured by present owners. Company shipped sufficient ore, in the first quarter of 1906, to pay for the small machinery plant on hand, and all development work. Management and property are regarded favorably.

CHIHUAHUA COPPER MINING CO. **MEXICO.**

Office: Bearinger Bldg., Saginaw, Mich. Operating office: Apartado 296, Chihuahua, Mex. Mine office: Santa Barbara, Hidalgo, Chihuahua, Mex. E. F. McCausland, president; Ross D. McCausland, vice-president and general manager; Norman Rupp, secretary; E. G. Rust, treasurer; preceding officers, J. G. Palmerton, Geo. W. McCausland and F. R. Messinger, directors; Ray T. Chapman, superintendent; E. N. Funston, mill superintendent; Sidney A. Long, engineer. Organized 1907, under laws of Arizona, with capitalization $1,500,000, shares $10 par; issued, $98,000. Cash on hand, Aug. 31, 1907, was circa $50,000, with liabilities of circa $10,000. Annual meeting, third Tuesday in February.

Lands, 104 hectares, in the Chorreros, Santa Barbara and Carizal tricts of Chihuahua. Property was said to include the Justicia y in the Chorreros Mountains, bought of Madero Hermanos for 40,00 but it was reported, April, 1908, that bond on the Justicia y Anexas l forfeited, after 2 payments. Properties show 8 ore bodies, of which development, are reported as 3′ to 8′ wide and traceable circa 4 mile ing chalcopyrite, bornite and nickeliferous pyrrhotite, averaging 5% 5 oz. silver and 0.6% nickel. The Justicia mine has a 200′ sha shafts being the Sidney, 100′; Bronces, 400′, and the Carizalillo s 75′ and 100′, mine having circa 3,500′ of workings, estimated to show tons of ore, with 75,000 tons blocked out.

The Hathaway mine, 18 miles south of Santo Domingo and 12 mi of Falomir station, on the Kansas City, Mexico & Orient Ry., has but persistent veins, carrying rich copper sulphides.

Los Bronces mine, at Santa Barbara. in the Chorreros Mount no equipment.

Equipment includes a 25-h. p. steam plant, a 120-h. p. Otto suction ducer, and two 60-h. p. Otto gas engines, having a fuel consumption of one pound per brake h. p.-hour. Equipment includes 25-h. p. and 35-h. and an 8-drill air-compressor.

Buildings include a stone carpenter shop, stone smithy, power pla stable, warehouse, office and 40 dwellings.

The concentrator, of about 30 tons daily capacity, built of stone an has a No. 4 Blake crusher and 2 jigs, producing concentrates of ab copper tenor. It is planned to double the capacity.

The Hathaway mine has old smelter, of antiquated design and eq of no value for modern uses.

Company plans sinking 3 new shafts, deepening present shafts, tunnel, building a power plant and building a new concentrator and p small smelter. In August, 1908, was producing circa 16 tons daily o trates of 15% copper tenor, and expected to reach a daily output of tons daily by 1909. Property is considered good and manageme efficient.

CHILCAT GOLD & COPPER CO.

Mine office: Haines, Alaska. Lands, 168 claims, on the Big Salm Presumably idle.

J. K. CHILD & CO., LTD.

Office: 33 Drury Bldg., Liverpool, Eng. Mine office: Coro Coro, Bolivia. J. L. Barber, chairman; R. D. Barber, mine manager; Thos cock, secretary. Organized Nov. 3, 1905, under laws of Great Britain, italization £70,000, shares £1 par, fully issued, succeeding Juan K. Chil pañía. Also is organized under laws of Bolivia, with capitalizatio bolivars. Mine, known as the Vizcachani, is 270 meters deep, carryi copper in conglomerate strata. Has a steam plant and modern m The mineral carrying native copper is dressed to barilla de cobre of a average copper tenor, production of barilla being 25 to 30 quintals d duced at an average cost of 12.43 bolivars per quintal. Production, circa 700,000 lbs. fine copper. Employs 250 men.

SOCIEDAD UNIÓN MINERA CHILENA.

Mine office: Cobija, Tocopilla, Antofagasta, Chile. Lands, 5 hec cluding the Condesa and Unión mines. Presumably idle.

SOCIEDAD CHILENA DE FUNDICIONES.

Mine office: Tamaya, Ovalle, Coquimbo, Chile. Works offices: C Coquimbo, Chile, and Tongoy, Ovalle, Coquimbo, Chile. The Tamay

irca 1860, are the principal ore producers. Company also has mines at
i and La Laja, in the province of Coquimbo. Has 2 smelters, the Fun-
nayacan, which is one of the oldest copper reduction plants in Chile,
0 very small calcining furnaces and 14 very small reverberatory fur-
of latter being used for casting ejes, 8 for bars and 2 for ingots, ejes
50%, bars 97% and ingots 99.5% copper tenor, which may be con-
xcellent practice for so antiquated a plant, especially as slags average
copper. Fuel, 1903, was 25,000 metric tons of Chilean coal, from
5,000 tons of Australian coke. Employs 350 men, at average wages
os daily. Smelter production, 1903, was ejes carrying 9,695,090 kilo-
copper.

Fundicion Tongoy has 2 reverberatory smelting furnaces and 5 calcin-
ces, producing ejes averaging 57% and Chile bars averaging 97%
gs running about 0.5%, fuel being local coal and imported coke, ores
eraging 15.4% copper tenor, with slag losses of 0.5%. Employs
en, at average wages of 1.2 pesos daily. In 1903 produced 1,177,000
fine copper, at estimated smelter cost of 16.3 pesos per metric ton.
ction, 1903, secured mainly from custom ores, was 23,968,609 lbs. fine

PPER CO., LTD. **CHILE.**

ered in Guernsey, March 4, 1905, with capitalization £400,000, shares
ffice and location unknown. Regarded with suspicion.

PPER SULPHATE SYNDICATE, LTD. **CHILE.**

101 Leadenhall St., London, E. C., Eng. J. E. G. Hadath, secretary.
ds in Chile were sold to Copaquire Copper Sulphate Co., Ltd.

CHILIENNE. **BOLIVIA.**

ffice: Coro Coro, La Paz, Bolivia. Operates mines of native copper
onglomerate strata.

DE BLOCKS, N. L. **AUSTRALIA.**

Formerly at Herberton, Cardwell Co., Queensland, Australia.

DE COMPANY, LTD. **AUSTRALIA.**

39 Queen St., Melbourne, Australia. British office: Palmerston
ndon, E. C., Eng. Mine and works office: Chillagoe, Lynd Co.,
, Australia. J. S. Reid, chairman; Harvey Patterson, vice-chairman;
itt, secretary; Edwin Habben, London secretary; E. A. Whitbery,
engineer; Peter Branden, mine manager; J. Horsburgh, smelter
ent; Fred Back, railway superintendent; W. A. F. Davies and E. J.
ine superintendents.

zed June 16, 1898, under laws of Victoria, as Chillagoe Proprietary,
anized as Chillagoe Railway & Mines, Ltd.; reconstructed, 1902, as
goe Railway & Mines, Ltd., and reconstructed for third time, June 5,
laws of Queensland, under present title, with capitalization £350,000,
par; 9s. paid in. Debentures, £500,000, at 5%, issued by New Chilla-
y & Mines, Ltd., registered February, 1902. Debentures were issued
holders agreed to permanently reduce interest rate to 5%, except in
shareholders have been paid dividends to exceed 1s. per share.
0 shares, of 5s. par, in the Mungana (Chillagoe) Mining Co., Ltd.,
organized by the predecessor of the Chillagoe Co., Ltd., March, 1901.
ear ending June 30, 1908, receipts were £270,276, with expenditures
. Quick assets were £240,275, and liabilities were £225,394.
1,863 acres, mainly held under special act of the Queensland Parlia-
an 80-acre smelter site and miscellaneous lands giving total holdings
res, in the Walsh & Tinaroo district. Mineral concessions include 9

groups, with 70 leases, expiring Jan. 1, 1948, held at annual rental of £ acre, with exemption from labor conditions, also 6 ordinary leases.

Principal mines are the Ruddygore, Zillmanton, Penzance and Queensl or Morrison. The district shows Silurian limestone, sandstone and co erates, with various fissure veins and contact deposits, carrying auri copper ores giving average returns of 3.5% copper and 2 oz. silver pe with traces of gold, and lead ores ranging in tenor about 20% lead, 8% and 2 oz. silver per long ton.

The Ruddygore, which is the principal mine, shows a large ore body, op by shaft, but worked mainly open-cast. Production, 1907, was 4,139 long of ore, yielding 337,276 lbs. fine copper and 10,411 oz. silver, an average re of 3.63% copper and 2.5 oz. silver per ton. A new shaft is planned. E ment includes a 6-drill air-compressor and an 8x12" hoist.

The Zillmanton mine has shafts of 360' and 250', shaving a 17' to 20' and, in 1907, produced 1,855 tons of ore, averaging 4.75% copper and L6 silver per long ton, with reserves of 18,000 tons. Mine was flooded, early 1 but has been reopened.

The Penzance, or Red Cap, mine, has a 200' shaft, but is worked m open-cast, in 1908 producing 853 tons of ore, ranging 2 to 6% in copper and circa 2.5 oz. silver per ton.

The Queenslander or Morrison mine has a 255' main shaft, with Co pump, carrying mainly low grade sulphide fluxing ore, and, in 1907, prod 2,232 long tons of ore, yielding 142,260 lbs fine copper. Reserves are estim at 18,500 long tons, averaging circa 3% copper and 3 oz. silver per ton. O to disappointing development, work was suspended on bottom levels Marc 1908.

Miscellaneous mines include the Hensey, having a 200' shaft, whic 1907, produced 76 tons of ore; the Dargalong mine, which shows aurif copper and lead sulphides; the Otho, which has proven disappointing in de ment; the McIllwraith, having a 250' shaft, which is idle; the Victoria, h a 600' shaft, which is idle; the Harper, which has a 368' shaft and is idle; the Hobson and Ti Tree mines, both idle. Fluxing properties includ Boomerang and Mount Lucy iron mines, and a limestone quarry at Mount

Equipment includes steam power at the principal mines, with 6 hoists for 500' each, and several air-compressors. Buildings include a 50x70' and iron machine-shop, and a 50x70' carpenter-shop and smithy, with 5 mine structures, and 11 dwellings.

The smelter, at an average distance of 4 miles from the different m receiving ore by railroad, is of 700 tons rated daily capacity, treating custom ores from the Mungana and other mines. The smelter has five 14 copper furnaces, and two 140-ton lead furnaces, the lead smelter usin Huntington-Heberlein process of reduction, with 8 kettles. Smelter inclu converter with 4 shells, taking 35% matte from the blast-furnaces, and tu out pimple metal averaging 79% copper and 100 oz. silver per ton. F wood, coal and coke, and water is taken from a 1,500-gallon dam across C goe Creek, which has a minimum flow of 4,000 gallons hourly. The smelte electric power.

The Mareeba to Chillagoe railway, owned by the company, has 102 of main line, and, July, 1908, had 84 miles of steel laid on the Etheridge sion, and planned reaching Einasleigh, 106 miles distant, in 6 weeks, an terminus, 140 miles from Chillagoe, early 1909. The railway is proving able.

Company employs about 600 men. Production, for fiscal year ending 30, 1908, was 53,112 long tons of ore, yielding 3,391,360 lbs. fine copper, long tons lead, and 478,478 oz. silver, these figures including metals made

ores of the Mungana. Production, 1907, from company's own ores, was 1,500,000 lbs. fine copper.

LAGOE COPPER PROPRIETARY, LTD. **AUSTRALIA.**

ad. Dissolved Dec. 26, 1902. Formerly at Chillagoe, Lynd Co., Queensustralia.

LAGOE RAILWAY & MINES, LTD. **AUSTRALIA.**

ad. Reconstructed June 5, 1905, as Chillagoe Company, Ltd. Very fully ed Vol. VI.

PAS COPPER CO. **MEXICO.**

ice: 1531 Railway Exchange, Chicago, Ills. H. M. McIntosh, manager; . Dow, superintendent. Organized Oct. 8, 1906, under laws of Maine. in the northwestern corner of the state of Chihuahua, Mexico, include cidor mine, having a ledge or dyke of circa 300' width, with an ore raceable about one-third mile, showing considerable native copper, ore, iminating the native metal, giving average assays of about 7% copper.

EWA COPPER MINING CO. **WISCONSIN.**

d. Lands sold, October, 1902, for debt. Succeeded by Corona Copper Co. Formerly at West Superior, Douglas Co., Wis. Described Vol. II.

AHUA DEVELOPMENT CO. **ARIZONA.**

d. Succeeded Jan. 9, 1907, by San Simon Copper Co. Formerly at , Cochise Co., Ariz. Very fully described Vol. VI.

LA CHIRIPA y ANEXAS. **MEXICO.**

e office: Zimapán, Hidalgo, Mex. León Lamaire y Ca., owners. s are La Chiripa, La Pretoria and El Moro mines, carrying argentifd and copper ores. Employed circa 50 men at last accounts.

CONSOLIDATED MINES CO. **ALASKA.**

e: 263 La Salle St., Chicago, Ills. Mine office: Landlock, Prince Willd, Alaska. Geo. L. McKay, president; Ira A. Town, vice-president; eis, secretary and treasurer; Jos. Kreis, general manager; Dr. Edward , superintendent. Organized April, 1906, under laws of Washington, talization $5,000,000, shares $1 par, as successor of Central Alaska Gold Co.

s are 28 placer claims, on the Chisna river, in interior Alaska, claimed $1.75 per cubic yard gold, which is more than doubtful, and comlso said to have quartz claims on the Chistochina river, circa 220 th of Valdez.

lands are 37 claims on Landlock Bay, near Valdez, including the eacock, Steinmetz and Kreis groups, latter east of the Reynolds-The Steinmetz group, near Valdez, has a shaft only 70' from the bay, re vein claimed to be 150' wide and to carry an average of 7% hich is a palpable exaggeration, though assays up to 23% copper, and silver values, have been secured. It is planned to drive a the Kreis group, to cut 7 veins outcropping at surface. Ore is o vessels by gravity.

predecessor of the Chisna Consolidated was guilty of advertising very flamboyant and remarkably uninstructive. The Steinmetz ap- is a property of some promise, but the present company advertised as an investment in proven properties, which is not true, and is ded favorably. Production, 1907, was circa 300 tons of ore, of average copper tenor.

EXPLORATION CO. **ALASKA.**

Formerly at McCarthy's Creek, Copper River district, Alaska. Vol. V.

E GOLD MINING CO. **ARIZONA & CALIFORNIA.**

10 Board of Trade, Pueblo, Colo. Mine office: Chloride, Mohave

Co., Ariz. L. Hoffman, president and manager; Dr. A. B. Seelye, vice-dent; J. H. Hoffman, secretary; C. Hoffman, treasurer; preceding officers J. R. Adams, directors. Capitalization $1,000,000, shares $1 par. Lands acres, known as the Samoa group, 4 miles east of Chloride, having auri silver-lead ores, said to carry average values of about $40 per ton, op by a 300′ shaft. Lands include the Iron Gossan group, 11 claims, in northeastern corner of San Bernardino county, California, near the Ne line, showing a 20′ to 150′ iron gossan, traceable about 1 mile, of iron carrying copper carbonates of about 1.6% average tenor.

COMPAÑIA MINERA y BENEFICIADORA DE METALES DE CHOIX, S. A. MEXI

Is the Mexican incorporation of the Choix Consolidated Mining Co.

CHOIX CONSOLIDATED MINING CO. MEXI

Office: 43 Wall St., New York, N. Y. Operating office: 516-355 So Broadway, Los Angeles, Cal. Mine office: Choix, Fuerte, Sinaloa, Mex. R. Thomas, president; Thos. E. Metcalfe and W. W. Thomas, vice-presiden J. R. Thomas, secretary; J. E. MacKechnie, general manager. Organiz May, 1902, under laws of Arizona, with capitalization $5,000,000, shares par, and protocolized under laws of Mexico.

Lands, 471 hectares, also several mill and smelter sites, on both sid of the Fuerte river, in the Choix district of Sinaloa and the Urique distri of Chihuahua. Apparently part of lands were sold, 1907, to Los Plata Development Co. The property originally included the Creston-Verde grou area 103 hectares, and the Colon-Espinocena group of 115 hectares. O bodies are claimed to measure 50′ to 300′ in width, occurring as contact d posits between porphyry, diorite and limestone, with gold ores in fissure vei in granite and quartzite. Property includes several antiguas.

Shipments, 1900-1902, of 1,062 tons of ore to the Aguascalientes smelte gave returns of 19.5 to 28% copper, with gross values of $127,915.44 and ne values of $47,940.61. Property considered promising. Apparently idle fo several years.

CHOTA NAGPUR MINES. INDIA.

Mine office: Chota Nagpur, Bengal, India. Were worked in very ancien days. Ore occurs as chalcopyrite, disseminated in schistose rocks. A local company did a little development work, 1903; since idle.

CHTASTIE MINE. BULGARIA.

Sold, June 24, 1907, to Widin Copper Syndicate, Ltd.

SOCIEDAD BENEFICIADORA DE CHUQUICAMATA. CHILE.

Office: Santiago de Chile. Mine office: Tarapacá, Tarapacá, Chile. Organized Apr. 30, 1902, under laws of Chile, with capitalization 225,000 pesos, shares 1,500 pesos par.

SOCIEDAD ESPLOTADORA DE CHUQUICAMATA. CHILE.

Office: Valparaiso, Chile. Mine office: Calama, Antofagasta, Chile. Organized Aug. 7, 1900, under laws of Chile, with capitalization £40,000, and reorganized, Jan. 18, 1904, with capitalization £100,000, shares £2 par.

SOCIEDAD MINERA CHURRUCA. PERÚ.

Mine office: Morococha, Junín, Perú. Organized 1904. Lands, in the San Francisco and Santa Cruz Mountains, near Morococha, are being developed by a tunnel known as the Roland East, with a force of 50 men. Production, 1903, was 228,683 lbs. fine copper.

COMPAÑIA MINERA DE LA CIENEGUITA, S. A. MEXICO.

Is the Mexican incorporation of the Cieneguita Copper Co.

CIENEGUITA COPPER CO. **MEXICO.**

Office: 1303-25 Broad St., New York, N. Y. Mine office: Minas de Cieneguita, Sahuaripa, Sonora, Mex. Geo. Beebe, president; J. H. Wilhelm, vice-president; C. W. Wilhelm, secretary and treasurer; Chas. W. Howbert, general manager; Frank Fitz, superintendent; preceding officers, August Gauch, Hon. C. Campbell and Dr. Eugene Boyce, directors; B. F. Tipton, mine superintendent; W. F. Oden, smelter superintendent.

Organized May 18, 1901, under laws of Arizona, with capitalization $10,000,000, shares $10 par, and reorganized, 1905, under laws of Nevada, with same capitalization, reconstruction being effected to eliminate a certain stock interest, known as the Christy, which stock in the old company was rendered worthless by the reorganization. Suits in the courts resulted in upholding the company. Holds property through the Compañía Minera de la Cieneguita, S. A., which has direct title to lands.

Lands, 937 hectares, circa 40 miles southeast of Sahuaripa, also about 40,000 acres of grazing lands, fairly watered and timbered. Property is in 4 groups. The Chipiona group carries about 1,800′ of the strike of a vein system; the Cargona group is near the Chipiona; the Ostimuri group, circa 6 miles southeast of the Chipiona, was worked extensively in early days, and the Tayapa group, lying west of the Osimuri, has several antiguas, carrying silver-lead and copper ores. Country rocks are recent acid eruptives, of rhyolitic nature, rhyolite tuffs and rhyolite breccias, with diabase dykes, probably diorite. Development includes shafts of 125′ and 136′, but is mainly by 18 tunnels, of 35′ to 1,200′ length, with circa 3 miles of workings. In 1907 new openings of 3,919′ were made. Veins are of practically vertical dip, and 13 ore bodies have been located, with 5 under development, these being reported as 3′ to 50′ in width, and one, traceable 3 miles, opened to extreme depth of 800′ by tunnel. Ores are sulphides, first claimed to carry average values of 5% copper, 70 oz. silver and $3 gold per ton, which figures are grossly exaggerated, and stated later to run 4% copper and 61 oz. silver, but average assays December, 1907, gave 2.5% copper and 45 oz. silver. Company, in 1906, claimed 2,000,000 tons of ore in sight, with 300,000 tons blocked out for stoping, which was absolutely untrue, as the company still lacks any considerable amount of ore blocked out for stoping.

Equipment at the mine includes a 100-h. p. steam plant, with 6-drill air-compressor, 30x60′ stone machine-shop, assay office, store, miscellaneous mine buildings and 120 dwellings for employes.

The smelter, at Chipiona, 1,500′ from the portal of the main tunnel, and receiving ore therefrom by tram-line, has Blake crushers and rolls, a 75-ton lining furnace and 2 small wood-burning reverberatory furnaces, of about 100 tons daily capacity each. Fuel is inferior wood, costing $3 per cord. Smelter was blown in Sept. 24, 1906, but apparently has proven a misfit, and Howbert recommends the installation of a 150-ton pyritic smelter, and company is said to plan a mill also.

Transportation is by a 65-h. p. 2-motor freight automobile.

At the annual meeting, Feb. 3, 1908, the financial statement showed $1,000 had been advanced to the Mexican operating company, for development and equipment. Despite much talk regarding the richness of these ores, the large production imminent, and the tremendous profits to be realized, the actual output for 1907 was only 42 tons of 40 to 50% copper matte, of which 12 tons were shipped. The property, while not devoid of promise, is poorly located as to transportation facilities, and the company's estimates of ore reserves, production and profits are utterly unwarranted. The company is not regarded favorably.

MINA CIGARRERO.

Office and mine: Baca, Jiménez, Chihuahua, Mex. I. Rodrigue manager. Ores are mainly high-grade silver-lead carbonates, avera 26 grams gold per ton, with gold values increasing and silver values at depth.

CIMA COPPER CO. CAL

Office: Searchlight, Nev. Mine office: Cima, San Bernardino Was exploring for copper, 1907, with a diamond drill.

CIMARRON MOUNTAIN MINING CO. NEW

Office: 13 Dodge Blk., Lansing, Mich. Mine office: Cimarron, C N. M. Hon. Justus S. Stearns, president; C. C. Hopkins, vice-pre S. Porter, secretary and treasurer. Organized Oct. 24, 1904, unde New Mexico, as successor of Consolidated Verde Mining & Milling capitalization $2,000,000, shares $1 par; issued, $1,800,000.

Lands, 65 acres, patented, in the Cimarron district of the Ma grant, 35 miles from Springer, the nearest railroad station, with go road connecting. Property shows gossans of decomposed limonite a comb quartz carrying gold values and copper stains. Has circa workings, mainly tunnels. Practically no work has been done b company.

CINCINNATI CONSOLIDATED MINING CO.

Office: care of A. Hanauer, Jr., Salt Lake City, Utah. Lan Beaver county, Utah. Refuses a statement; idle some years and moribund.

CINCO DE MAYO MINING & SMELTING CO.

Office: San Antonio, Tex. Letter returned unclaimed from fo office, Descubridora, Mapimí, Durango, Mex. Alfred Van der Stuc dent; E. Harms, vice-president and general manager; G. C. Caroth tary; Douglas Muir, general manager. Lands include the Mimbe a dara mines, both copper properties, latter showing a 4′ vein of 8 veloped by shafts, No. 1 being 75 meters and No. 3 being 30 meters Was shipping ore to Torreón smelter, until 1907 copper slump, circa 50 men.

CIRCUMSTANCE GOLD & COPPER MINING CO. A

Mine office: Huron, Yavapai Co., Ariz. Idle and apparently mo

CITY ROCKS MINING CO.

Office: Shelden Bldg., Houghton, Mich. Mine office: Alta, Salt Utah. Wm. S. Cleaves, president; John Edwards, vice-president Edwards, secretary and treasurer; W. S. Zehring, assistant secreta L. Edwards, general manager. Organized 1906, under laws of U capitalization $1,000,000, shares $1 par. Has an issue of convertil Lands, paid for 1907, area circa 250 acres, are about one-half mile Columbus Consolidated and near the Continental-Alta, showing a m of about 12′ average width, with 2 other promising ore bodies un Mine is opened by 2 tunnels, the Topeka, or upper tunnel, being c and the lower or City Rocks tunnel, circa 2,700′, all but first 300′ being on the vein, face of tunnel having a back of 900′ showing a Also has a 1,500′ tunnel, and plans a fourth tunnel, to be started cally below No. 3, and to run 6,000′. Ores are argentiferous lead a sulphides, and highly argentiferous lead carbonates. Shipped running 12.5% copper, 16 oz. silver and $1 gold per ton, also carb averaging 30% lead and 10 oz. silver per ton. Has gasoline pow short aerial tram, connecting with the 5-mile aerial tram of the Co Alta. Extensive ore dumps, remaining from old workings, were lea to John C. Stillwell, for culling. Property considered promising.

CLAIRE COPPER CO. **IDAHO.**

Mine office: Montpelier, Bear Lake Co., Idaho. G. C. Gray, president and treasurer; A. D. Young, secretary. Organized Sept. 16, 1902, under laws of Idaho, with capitalization $200,000, shares 50c. par. Lands, 3 claims, area 60 acres, with fissures in sandstone, and contact deposits between limestone and porphyry, giving ores assaying 4.6% copper, 10 oz. silver and about $1 gold, from a 12" vein carrying cuprite, melaconite, dioptase and chrysocolla, opened by tunnels of 100' and 200'. Idle.

CLARA CONSOLIDATED GOLD & COPPER MINING CO. **ARIZONA.**

Office: 536 Byrne Bldg., Los Angeles, Cal. Mine office: Planet, Yuma Co., Ariz. Geo. Mitchell, president; T. J. Carrigan, vice-president and general manager. Organized circa August, 1908, with capitalization $3,000,000, as a merger of the Clara Gold & Copper Mining Co., Signal Copper Co., Crown Princess Mining Co., Crown Queen Mining Co. and Morrow Copper Co.

Lands, 132 claims, having about 6,000' of workings. The Clara mine, circa 10 miles from Planet, has a vein of 30' to 100' width, opened by shaft and tunnel, with circa 2,000' of workings, showing malachite and chrysocolla, with copper sulphides at depth, all carrying fair silver values and exceptional gold values.

The Signal group includes the Copper Prince mine, which has a 150' shaft showing a large ore body.

CLARA COPPER CO. **UTAH.**

Dead. Formerly at Thompsons, Grand Co., Utah.

CLARA GOLD & COPPER MINING CO. **ARIZONA.**

Dead. Merged, circa August, 1908, in Clara Consolidated Gold & Copper Mining Co. Formerly at Planet, Yuma Co., Ariz. Described Vol. VI.

CLARA MINING & SMELTING CO. **MONTANA.**

Dead. Formerly at Butte, Silver Bow Co., Mont. Described Vol. VI.

CLARA ST. DORA COPPER MINING CO. **AUSTRALIA.**

Dead. Succeeded, 1897, by New Clara St. Dora Copper Mining Co., N. L. Formerly at Hergott Springs, South Australia. Described Vol. IV.

CLARK CONSOLIDATED MINING CO. **ARIZONA.**

Dead. Formerly at Douglas, Cochise Co., Ariz. Described Vol. VI.

CLARK COPPER CO. **CALIFORNIA.**

Office: Los Angeles, Cal. Mine office: Greenwater, Inyo Co., Cal. F. M. Lyon, vice-president; H. L. Percy, secretary and treasurer; Jas. P. Harvey, superintendent; preceding officers and Patrick Clark, directors; J. Ross Clark, general manager. Organized 1906. Lands, 6 claims, near the Furnace Creek Copper Co., showing carbonate ores assaying 8 to 18% copper. Idle.

CLARK DEVELOPMENT CO. **ARIZONA.**

Office: care of H. S. Clark, secretary and manager, Los Angeles, Cal. Mine office: Chloride, Mohave Co., Ariz. Capitalization $2,000,000. Lands include the Chester mine, sometimes known as the Distaff, having 2 shafts, deepest circa 100', with about 1,000' of workings.

CLARK MINE. **MICHIGAN.**

Office: care of Dr. Léon Estivant, owner, 47 Ave. de l'Alma, Paris, France. Mine office: Copper Falls, Keweenaw Co., Mich. R. R. Godell, agent. Lands, 3 acres, including mines formerly known as the Clark, Bell and Montreal, south of Copper Harbor, between Lake Fannie Hooe on the north and Bakfast Lake on the south, including Lake Manganese. Mine, opened 1858, copper, had a 16-stamp gravity mill, built 1874, run by water power from Lake Manganese, mill now being dismantled. Property also carries a promising vein of pyrolusite, average of assays, 1900, by Duparc, of Geneva, giving 30% manganese and 1.36% copper. Has shipped circa 1,200 tons of high

grade manganese ore. Was tested, 1905, by diamond drills. Idle. F described Vol. II.

CLARK-MUNGER CO. ARIZ

Office and mine. Phoenix, Maricopa Co., Ariz. Mine, in the Mazatzal trict, circa 55 miles from Phoenix, has a 60′ shaft and 20-ton smelter. A s shipment, 1909, to El Paso smelter, returned 22% copper, 6 oz. silver and $ gold per ton.

KÖNIGLICHE HÜTTENAMT CLAUSTHAL. GERMA

Works office: Clausthal, Hanover, Germany. Herr Bergrat Boltze, m ger. Property is a silver-copper smelter, operated under state auspices.

CLAYTON MINING & SMELTING CO. IDA

Mine office: Clayton, Custer Co., Idaho. Lands, 18 claims, showing arg tiferous copper and lead ores. Has water power and a smelter rated at 50 t Idle.

CLEAR CREEK MINING & REDUCTION CO. COLORA

Dead. Formerly at Russell Gulch. Clear Creek Co., Colo. Deseri Vol. VI.

CLEAR GRIT MINE. MONTA

Owned by Washoe Copper Co.

CLEARWATER GOLD & COPPER MINING CO. IDA

Office: Wallace, Idaho. Mine office: Clearwater, Idaho Co., Idaho. Or ized 1907, under laws of Idaho, with capitalization $2,500,000, shares $5 Lands, 5 lode claims, 1 fractional, and 3 placer claims, on the north fork of Clearwater river, circa 20 miles south of Wallace. Has 2 tunnels, longest 100′, showing ore assaying 15 to 23% copper and 3 to 20 oz. silver per to

CLEOPATRA COPPER CO. ARIZO

Office and mine: Jerome, Yavapai Co., Ariz. Hon. Geo. W. Hull, presid treasurer and general manager; H. E. Wilcox, secretary. Organized 1902, u laws of Arizona, with capitalization $4,000,000, shares $1 par, and plan September, 1907, increasing capitalization to $10,000,000.

Lands, 13 claims, 11 patented, area circa 200 acres, showing fissure gash veins carrying ores assaying 1 to 65% copper and 1 to 500 oz. silver ton, with fair gold values. Has 6 shafts, of 25′ to 150′ depth, and 9 tun the Dillon tunnel, of circa 3,200′ length, planned to connect with 1888 shaft, showing a 3′ vein of argentiferous and auriferous copper sulph of good average tenor. The Dillon tunnel passes through the Cleopatra lands of the Hull Copper Co., and latter has permission to use the tu through the Cleopatra tract. Company estimates 2,000,000 tons of ore in si which is a preposterous figure. Some good ore has been taken from cross- driven from the Dillon tunnel, but apparently no commercial ore bodies h been developed thereby.

Equipment includes a steam plant, hoists, air-compressor and neces mine buildings. A 100-ton smelter, built 1906, was not blown in, simply f lack of ore, notwithstanding the immense tonnage claimed in sight. Comp is developing with a small force, and plans blowing in the smelter, eventu

CLEOPATRA GROUP. CALIFORNIA & OREG

Office: care of F. H. Osgood, Seattle, Wash. Mine office: Galice, Josep Co., Ore. F. H. Osgood and Col. J. S. Crawford, owners. Lands, 45 claims a 40-acre millsite, in Del Norte county, California, and Josephine county, gon. Slight development shows auriferous and argentiferous copper ore, native copper in masses up to several hundredweights. District is isolated difficult of access. Idle for several years.

CLEVELAND-ARIZONA MINING CO. ARIZO

Dead. Lands sold, 1907, to El Tiro Copper Co. Formerly at Red R Pinal Co., Ariz. Described Vol. VI.

CLEVELAND-MONTANA MINING & DEVELOPMENT CO. **MONTANA.**

Office and mine: Butte, Silver Bow Co., Mont. D. A. McKenzie, general manager; preceding officer, Frank S. Mitchell, Frank Hartzell, D. D. Bogart and D. Dorais, directors. Organized Feb. 15, 1905, under laws of Montana, with capitalization $1,000,000, shares $1 par. Lands, in Leslie Gulch, southeast of Butte, have a tunnel, said to be 1,000′ long. Is not regarded favorably. Presumably idle.

CLEVELAND-NEVADA MINING CO. **NEVADA.**

Letter returned unclaimed from former mine office, Black Horse, White Pine Co., Nev. Organized 1907, with capitalization $5,000,000. Is said to be an auxiliary of the Amalgamated Nevada Mines & Power Co.

CLIFF MINE. **MICHIGAN.**

Owned by Tamarack Mining Co.

CLIFTON-ARIZONA COPPER CO., LTD. **ARIZONA.**

Mine office: Clifton, Graham Co., Ariz. Organized 1907, under laws of Arizona, with capitalization $750,000.

CLIFTON-ARIZONA COPPER CO., LTD. **ARIZONA.**

Dead. Succeeded, June 6, 1901, by Clifton Consolidated Copper Mines of Arizona, Ltd., also dead. Formerly at Clifton, Graham Co., Ariz.

CLIFTON CONSOLIDATED COPPER MINES OF ARIZONA, LTD. **ARIZONA.**

Dead. Absorbed, 1903, by New England & Clifton Copper Mines of Arizona. Formerly at Clifton, Graham Co., Ariz.

CLIFTON COPPER CO. **NEW MEXICO.**

Office: Deming, N. M. Mine office: Santa Rita, Grant Co., N. M. J. L. Burnside, president; F. F. Rogers, secretary; M. M. Z. Elliott, superintendent. Organized 1900, with capitalization $500,000, shares $5 par. Lands, in the central district of Grant county, were in litigation until 1906. Mine has 5 shafts, deepest 235′, showing a vein of 40′ to 50′ claimed length and one-half mile length, carrying oxide, carbonate and sulphide ores, with occasional native copper, ore being of concentrating grade, with occasional high-grade paystreaks. Mine shows considerable ore ready for stoping. Has steam hoists and a 65-ton concentrator with 2 Huntington mills, 2 Wilfley tables and 2 Standard concentrators. Idle several years.

CLIFTON COPPER BELT MINING CO. **UTAH.**

Office: 24-65 West Second South St., Salt Lake City, Utah. Mine office: Nephi, Juab Co., Utah. Clyde H. Wilson, president; Frank L. Wilson, secretary, treasurer and general manager. Capitalization $25,000, shares 5c par. Lands, in the Deep Creek district, show ores assaying up to 35.5% copper, 9 oz. silver and $1.20 gold per ton. Also has ores carrying lead, nickel, tin and bismuth, values apparently being mainly in auriferous bismuth.

CLIFTON COPPER MINES, LTD. **ARIZONA.**

Office: 52 Wall St., New York, N. Y. Mine office: Clifton, Graham Co., Ariz. Organized July 29, 1903, with capitalization $1,000,000, shares $5 par, as a reconstruction of the Arizona Copper Syndicate, which forfeited its West Virginia charter, 1902, on account of unpaid corporation tax. Is controlled, through ownership of 70% of stock, by Standard Consolidated Copper Co. Lands, 8 claims, area 160 acres, lying east of the Standard mines. Production, 1905, was 37,517 lbs. fine copper.

CLIFTON COPPER MINING CO. **ARIZONA.**

Dead. A stock-jobbing scheme, promoted 1898, by Julius Leszynsky. Formerly at Clifton, Graham Co., Ariz.

CLIFTON GOLD & COPPER CO. **ARIZONA.**

Office and mine: Clifton, Graham Co., Ariz. A. S. Rosecrans, manager; Edgar Cobb, consulting engineer. Organized circa August, 1907. Lands

include the Oregon group, having a shaft showing ore of 5 to 8% tenor.

CLIMAX GROUP MINING CO. WASHIN

Office: 1203 Maxwell Ave., Spokane, Wash. Mine office: Baring, Co., Wash. J. J. Browne, president; J. W. Douglas, vice-president; Fra Smith, general manager. Organized under laws of Washington, with italization $1,500,000, shares $1 par. Lands, 9 claims, area 180 acres, 20-acre millsite, in the Index district. Country rocks are granite and di showing several contact veins, of which two are developed by a 37′ shaft, short tunnels and a 345′ tunnel not yet in ore. Ores are bornite and chal rite, giving assays of 3 to 34% copper, 20 to 70 oz. silver, and from a tra $6 gold per ton. Property idle for some years, except for assessment work.

CLIMAX MINING CO. COLORA

Mine office: Granite, Chaffee Co., Colo. B. H. Pelton, president. Prope is the Spondulix mine, opened by a shaft showing auriferous and argentifer copper ore. Presumably idle.

CLIMAX MINING CO. COLORA

Dead. Formerly at Ouray, Ouray Co., Colo.

CLIPPER MINING CO. WASHINGTO

Dead. Formerly at North Bend, King Co., Wash. Very fully describ Vol. VII.

CLONCURRY CELESTIAL COPPER & OPTIONS CO. AUSTRALI

Office and mine: Cloncurry, Queensland, Australia. Organized cir January, 1908, with capitalization £5,000, shares £10 par.

CLONCURRY COPPER & GOLD EXPLORATION CO, LTD. AUSTRALIA

Offices: 39 Lombard St., London, E. C., Eng., and Brisbane, Queensland Australia. Mine office: Cloncurry, Queensland, Australia. F. H. Hopkins mine manager; Alex Doig, London secretary. Organized Jan. 22, 1906, under laws of Queensland, with capitalization £5,000, shares £5 par. Lands, 560 acres, near the Corella river.

CLONCURRY COPPER & SMELTING CO., LTD. AUSTRALIA.

Dead. Succeeded Oct. 29, 1895, by New Cloncurry Copper & Smelting Co., Ltd. Formerly at Cloncurry, Beaconsfield Co., Queensland, Australia.

CLONCURRY EXPLORATION SYNDICATE, LTD. AUSTRALIA.

Office: 31 Lombard St., London, E. C., Eng. Mine office: Cloncurry, Queensland, Australia. Organized Jan. 22, 1907, under laws of Great Britain, with capitalization £7,000, shares £1 par.

CLONCURRY RAILWAY & DEVELOPMENT SYNDICATE. AUSTRALIA.

Office: 541 Salisbury House, London, E. C., Eng. Mine office: Cloncurry, Queensland, Australia. Lord Ernest W. Hamilton, chairman; F. A. Labouchere, secretary. Organized June 14, 1906, under laws of Great Britain, with capitalization £50,000, shares £1 par, fully issued.

COMPAÑIA CLORURADORA DE COBRE. CHILE.

Mine office: Melhagua, Santiago, Chile. Property shows large ore bodies of low grade, mainly blanket veins carrying 4 to 6% copper. Works, at Noviciado, include a plant for leaching, but apparently the company has not made a success of its venture.

CLUIN COPPER DEVELOPMENT SYNDICATE, LTD. IRELAND.

Office: 356 Winchester House, London, E. C., Eng. Mine office: Allihies, County Cork, Ireland. R. J. Norton Dawson, chairman; A. E. Middleton, secretary. Organized Aug. 26, 1904, under laws of Great Britain, with capitalization £10,000, shares £1 par; issued, £7,892. Property is an option to lease, at £20 yearly, plus 5% royalty, a tract of about 900 acres, lying southwest of lands of the Berehaven Copper Mines, Ltd. Idle.

CLUSTER MINING CO. **UTAH.**

Mine office: Bingham Canyon, Salt Lake Co., Utah. Lands, lying between the Bingham Consolidated and United States mines, were planned to be developed by a 1,000′ tunnel. Is in litigation with Ernest Bamberger over title to apex of vein. Has produced circa 1,000 tons of medium grade ore. Idle.

COAHUILA MINING & SMELTING CO., LTD. **MEXICO.**

Office: Apartado 72, Monterey, N. L., Mex. Mine office: Jimulco, Viesca, Coahuila, Mex. G. F. Meehan, president; Frank J. Llewellyn, vice-president; H. B. Bennett, secretary; Walter E. Parker, general manager; F. B. Draper, superintendent. Company is operated as a close corporation, but apparently has paid dividends. There is complaint from minority shareholders that they cannot obtain information.

Property includes the Santa Maria, Sultana and other mines, carrying auriferous and argentiferous copper and lead ores, opened by a 700′ main shaft and a 1,000′ main tunnel, equipped with steam and electric power. Company was said, August, 1907, to have bonded the Filipinas copper group, area 25 hectares, adjoining Las Vigas Mining Co. at San Sóstenes, Coyame, Iturbide, Chihuahua, Mex.

A 250-ton smelter, with steam and electric equipment, blown in early 1903, is connected with the mines by rail, but the smelter has not been operated regularly. At last accounts the company was manufacturing guayule rubber, and apparently had turned its old smelter into a rubber factory. Latest reported production, 1903, was 178,865 lbs. fine copper.

COAST LINE COPPER CO. **MEXICO.**

Office: Caborca, Altar, Sonora, Mex. John T. Cave, president; Judson A. Elliott, secretary; John Henderson, consulting engineer; John Cave, general manager. Organized, 1902, as successor of the Porvenir de Sonora company. Lands include a gold property at El Oro, 14 miles from Pozo, in the Ures district, and an idle copper property, formerly a profitable silver producer, in the Altar district. Gold mine has a 100-ton mill and cyanide plant. Employed circa 25 men at last accounts.

COAST RANGE COPPER CO. **OREGON.**

Office and mine: care of T. R. Sheridan, Roseburg, Douglass Co., Ore. Organized Jan. 16, 1903, under laws of Oregon, with capitalization $25,000, shares $50 par. Presumably idle.

COBAR CHESNEY COPPER & GOLD MINING CO. **AUSTRALIA.**

Dead. Lands sold to Great Cobar, Ltd. Formerly at Cobar, Robinson Co., N. S. W., Australia. Fully described Vol. VI.

COBAR COPPER CO., LTD. **AUSTRALIA.**

Office: 308 Winchester House, Old Broad St., London, E. C., Eng. Mine office: Cobar, Robinson Co., N. S. W., Australia. A. E. Barton, chairman; A. E. McMahon, secretary. Organized Feb. 9, 1907, under laws of Great Britain, with capitalization £70,000, shares £1 par.

COBAR CORPORATION, LTD. **AUSTRALIA.**

Dead. In 1907 experimented with an electrical ore finder, this work resulting in liquidation. Formerly at Cobar, Robinson Co., N. S. W., Australia.

COBAR FREEHOLD COPPER MINING CO., N. L. **AUSTRALIA.**

Mine office: Cobar, Robinson Co., N. S. W., Australia. Organized 1907, under laws of New South Wales, with capitalization £15,500, shares 10s. par. Lands, sundry claims about one-half mile from the Great Cobar, slightly developed by a shallow shaft showing malachite and azurite.

COBAR GOLD MINES, LTD. **AUSTRALIA.**

Office: 10 Austin Friars, London, E. C., Eng. Mine office: Cobar, Robinson Co., N. S. W., Australia. A. R. Stephenson, chairman; Thos. Buckland,

managing director; J. Bondeson, mine manager; Wm. Bailey, s
ganized May 3, 1898, under laws of Great Britain, as a reconstru
pany by same name that was formed March 17, 1896, with
£200,000, shares £1 par; issued, £176,407. Property is leases of
gold mining lands, 50 acres of water rights and a 50-acre millsite.
a large body of low grade auriferous copper ore. Equipment in
stamp mill, cyanide plant and slimes plant, and it is planned to
plant for the treatment of sulphide ores. Accounts for 2 years,
30, 1906, showed receipts, from production, of £57,030, with £7,5
with £45,775 carried forward to credit of profit and loss.

COBAR JEWEROO MINING CO., N. L.

Office: Wrightsville, N. S. W., Australia. Mine office: Ca
belego Co., N. S. W., Australia. Organized early in 1907, under
South Wales, with capitalization £3,000, shares £10 par. Is a pro

COBAR LUCKNOW COPPER MINING CO., N. L.

Office and mine: Cobar, Robinson Co., N. S. W., Australi
early 1907, under laws of New South Wales, with capitalization
£10 par. Is a prospect only.

COBRE DE GRANDE MINING CO.

Dead. Formerly at Sahuaripa, Sonora, Mex. Described Vol

COBRE GRANDE COPPER CO.

Mine office: La Cananea, Arizpe, Sonora, Mex. Was organiz
the Cobre Grande mine, under a bond given by Col. Wm. C. Gree
vided for quarterly payments of $37,500, with the proviso that f
ments should forfeit claims. No payments were made under th
and property, reverting to Col. Greene, later became part of
solidated Copper Co., S. A. A controlling interest in the Cobre
pany was bought, for a nominal sum, by Col. Greene, and placed
ury of either the Cananea Consolidated or Greene Consolidated.
holders of the Cobre Grande have brought suit against the G
dated Copper Co. and Cananea Consolidated Copper Co., S. A., b
the litigation is directed at Col. Greene personally, through these
Lands once held by the Cobre Grande were forfeited to the Me
ment, and afterwards denounced by the Cananea Consolidated
direct title from the government. It is obvious that the Cobre G
Co. has no recourse against either the Cananea Consolidated, G
dated or Greene-Cananea, the only chance of recovery being
damages against Col. Greene personally, and on the evidence s
would appear impossible.

COBRELOMA CONSOLIDATED COPPER CO.

Letter returned unclaimed from former office, 212 Henn
Angeles, Cal. Mine office: Middlemarch, Cochise Co., Ariz.
president; M. M. O'Gorman, vice-president; Wm. J. Gird, secret
urer; preceding officers, Robert C. Davis and Edw. C. Kelley, dire
ized under laws of California, with capitalization $1,000,000, sh
Lands, 43 claims, in 9 groups, which have had more or less desu
ment in the past, 9 miles west of Pearce. Surface indications
but development, to a limited depth, has shown no large ore
erty is opened by the 105' Ella shaft, showing 4% ore; the 105'
and the 120' Emma tunnel, the 344' Iron Age tunnel, crosscutti
and the 386' Carpena tunnel, planned to cut rich ore outcroppin
face of Richmond Hill, and a 90' tunnel on the Cobreloma clai
penetrate Copper Glance Hill, which shows sulphide ore in a 70'
also are several other shallow shafts. Ore occurs in a mineral
6 veins, substantially parallel, limestone and porphyry being the

with a garnet capping that is 200′ wide in places. Property has steam power and a telephone system. In 1906 company planned a consolidation with the Middlemarch Copper Co.

COBRE MINING CO. **ARIZONA.**

Mine office: Silver Bell, Pima Co., Ariz. Lands, 15 claims, known as the Copper Prince group, circa one mile south of the Copper Giant, slightly developed by a two-compartment shaft. Presumably idle.

MINAS DE COBRES DE CARRIZALILLO. **CHILE.**

Mine office: Chañaral, Atacama, Chile. Property includes several old and deep mines, with one shaft 2,122′ deep, but idle, because of heavy inflow of water, mine lacking adequate pumping equipment.

COMPAÑIA MINERA LA COBRIZA. **MEXICO.**

Office: Monterey, N. L., Mex. Mine office: Santa Barbara, Hidalgo, Chihuahua, Mex. Donald R. Morgan, president and general manager; W. B. Van Voorhees, secretary; Edw. J. Coshan, superintendent. Capitalization, 500,000 pesos. Lands in the Chorreros Mountains, include the Brooks group, having 2 shafts. A concentrator is planned. Company also owns the Minillas mines, which have produced some auriferous silver-lead ore.

COMPAÑIA MINERA LA COBRIZA. **MEXICO.**

Mine office: San Dimas, Durango, Mex. Idle and apparently moribund.

COMPAÑIA MINERA LA COBRIZA y ANEXAS. **MEXICO.**

Mine office: Alamos, Sonora, Mex. Manuel Salazar y Perron, manager. Has argentiferous and auriferous copper ores, developed by shafts and tunnels.

MINA COBRIZAS. **BOLIVIA.**

Office and mine: Lipez, Potosí, Bolivia. Is a considerable producer of native copper, making more or less silver as a by-product, both metals being found native, and in association. Is the largest Bolivian producer of native copper outside of the Coro Coro district.

SOCIEDAD MINERA COCHAY-COCHA. **PERÚ.**

Mine office: Morococha, Junín, Perú. Organized 1894, under laws of Perú. Is controlled, through ownership of practically entire stock issue, by Cerro de Pasco Mining Co. Lands, 4 pertenencias, including the San Miguel, Victoria and several smaller mines. Main ore body is a fissure vein in diorite with northeast and southwest strike, traceable 1 mile, property also having other ore bodies of less importance, some of which are workable. The San Miguel mine has a 550-meter tunnel, giving a back of about 90 meters, with portal 9′ above the level of Lake Morococha. Principal ores are enargite, tetrahedrite and chalcopyrite, with about 20,000 metric tons of high grade ore, averaging circa 17% copper and 7 oz. silver per ton, in sight. Has a pumping station, about 200 meters from mouth of tunnel. The San Miguel mine, opened 1894, produced to end of 1907, circa 40,000 metric tons of ore of 15% average copper tenor. Production, 1904, was 4,416 metric tons of ore yielding 1,947,102 lbs. fine copper, and, 1905, was 5,497 tons of ore averaging 11% copper and 2,166 grams silver per metric ton, secured at a cost of $10.50 per ton, yielding 1,450,554 lbs. fine copper. Employs circa 300 men.

COCHISE CONSOLIDATED COPPER CO. **ARIZONA.**

Office: 1404 Arrott Bldg., Pittsburg, Pa. Mine office: Paradise, Cochise Co., Ariz. Henry F. Alexander, president and general manager; W. C. Hagan, vice-president. Capitalization $1,500,000, shares $1 par.

Lands, 17 claims, circa 6 miles northeast of Paradise, including an unpopulated townsite called Pittsburg. Mine has the 150′ Ainsworth shaft, sunk at 60°, and the Treasure shaft showing a 4′ vein of medium grade chalcopyrite, claimed to give average assay values of circa $75 per ton in copper, silver and gold, which is a serious overestimate. The 2-compartment 180′

Duplex shaft shows mixed sulphides carrying good values in copper, sil gold, with heavy percentages of zinc. There also is a short tunnel.

Equipment includes a 150-h. p. Webber gasoline engine and a sma tric light plant. The 50-ton mill is 62x100′, having a crusher, 3 sets o 3 elevators, 2 jigs and 2 settling tanks. Water is supplied from 2 wel pumped into five 6,000-gallon tanks.

The company was in financial difficulties for some years, which culmi 1907, in sale of property, by sheriff, for $23,350, to Madison F. Larkin, et Scranton, Pa., shareholders having 6 months in which to redeem the pr Apparently this sale was set aside by Judge Doane Oct. 31, 1907, and pr was resold, by sheriff, June 27, 1908, to Gibson Abstract Co., as trus 4 judgments, leaving Larkin the principal creditor. Company appare hopelessly involved, with remote prospects of saving its property.

COCHISE COPPER CO. ARI

Mine office: Johnson, Cochise Co., Ariz. K. L. Hart, manager; G Brown, superintendent. Lands carry the extension of the vein of the P mine lying to the eastward. Has a shallow 2-compartment shaft, wit 500′ of workings.

COCHISE COPPER MINING CO. ARI

Dead. Reorganized, August, 1905, as Cochise Development Co., Fo at Bisbee, Cochise Co., Ariz.

COCHISE DEVELOPMENT CO. ARI

Office and mine: Bisbee, Cochise Co., Ariz. Lemuel C. Shattuck, pre C. L. Jones, vice-president and general manager; Harry Duey, sec Joseph M. Muheim, treasurer; R. J. Ledwich, mine superintendent. Org Aug. 1, 1905, under laws of Arizona, with capitalization $1,000,000, sha par, succeeding the Cochise Copper Mining Co. Annual meeting, secon day in January. Lands, 16 claims, area 176 acres, abutting on the Ho mine of the Copper Queen Consolidated, lying north of the Dividend and Dubacher gulch. Has a 600′ 3-compartment shaft, with a dr the 300′ level showing small bunches of sulphide ore. Machinery incl 10x30″ first-motion double-drum hoist, good for 1,200′, a 6-drill S straight-line air-compressor and a 100-h. p. Atlas boiler. Has an engine boiler-house, 20x40′ carpenter shop, 20x30′ smithy and a coal trestle. Pr considered promising. Idle.

COCHISE EXPLORATION & DEVELOPMENT CO. ME

Office: Bisbee, Ariz. Mine office: Fronteras, Arizpe, Sonora, M Lands, at the southern end of the Ajo Mountains, about 25 miles w Fronteras, show ores assaying well in copper, lead, silver and gold. P ably idle.

COCHISE MINING & MILLING CO. ARI

Dead. Formerly had copper claims in Cochise and Pinal counties, A

COCHISE PROSPECTING, MINING & DEVELOPMENT CO. ME

Dead. Succeeded, Jan. 25, 1906, by Brooks Consolidated Copper Co. merly at Fronteras, Arizpe, Sonora, Mex.

COCONINO COPPER CO. ARI

Dead. Formerly at Ryan, Coconino Co., Ariz. Property sold to Buc Mountain Copper Co. Very fully described Vol. III.

COCOPAH COPPER CO. CALIFO

Office: 1014 Central Bldg., Los Angeles, Cal. Mine office: Needle Bernardino Co., Cal. Dr. S. D. Godshall, vice-president and manager; Murphy, president; G. Holterhoff, Jr., secretary and treasurer. Lands a Copper World group, formerly operated by the Ivanpah Consolidated Sm Co., said to have produced circa $500,000 worth of ore under former owne

COEUR D'ALENE EAGLE MINING CO. **IDAHO.**

Office: care of C. E. Mitchell, secretary, Spokane, Wash. Mine office: Lane, Kootenai Co., Idaho. B. N. Danskin, president; R. H. Dunn, vice-president. Organized circa 1906, under laws of Washington, with capitalization $1,500,000, shares $1 par. Lands, 4 claims, area 80 acres, on Eagle Hill, 2 miles from Lane, having a 60′ shaft and 115′ tunnel showing auriferous and argentiferous lead and copper ores. Has a 5-drill air-compressor and 4 buildings. Resumed work January, 1908, after 4 months idleness.

COEUR D'ALENE PACIFIC MINES. **IDAHO.**

Office: care of Dr. Jas. Sutherland, Spokane, Wash. Letter returned unclaimed from former mine office, Mullan, Shoshone Co., Idaho. J. A. Reinhart, vice-president; M. N. Stratton, secretary and treasurer; preceding officers, E. A. Patrick and E. Jessup, directors. Lands, 2 claims, near the Silver Cable mine, circa 9 miles east of Mullan, showing fair surface indications of lead and copper ore, with a short tunnel.

ELBERT C. COFFMAN. **MEXICO.**

Mine office: Teocaltiche, Jalisco, Mex. Property is the San Felipe mine, carrying auriferous and argentiferous copper ores.

COLDWATER COPPER MINING CO. **COLORADO.**

Office: 232 West Cedar St., Kalamazoo, Mich. Mine office: Encampment, Carbon Co., Wyo. Z. L. Baldwin, president; E. S. Drury, vice-president; Edwin Gillis, secretary and treasurer; Burr Lobdell, general manager. Organized May 18, 1900, under laws of Wyoming, with capitalization $1,000,000, shares $1 par. Lands, 5 claims, area circa 50 acres, also 20 acres miscellaneous lands, in the Pearl district of Larimer county, Colorado. Property, known as the Wolverine mine, has 3 fissure veins in granite and diorite, of which 1, of 20′ estimated width, shows oxidized ores and native copper, with sulphides at a little depth, estimated to carry an average of 10% copper and 8 oz. silver per ton, opened by shafts of 80′ and 170′, bottom of principal shaft showing massive chalcocite and a little disseminated chalcopyrite, of high average grade. Has steam power. Property is leased, for a 3 to 5 year term, to the Wolverine Leasing & Mining Co., composed of Coldwater shareholders. Idle.

COLEBROOK PROSPECTING ASSOCIATION. **TASMANIA.**

Mine and works office: Rosebery, Montagu Co., Tasmania. Senator Clemons, chairman; Cecil Rae, smelter superintendent. Lands circa one mile from Rosebery, show chalcopyrite in a schistose gangue, said to be self-fluxing and adapted to cheap smelting. Mine is worked opencast, with 3 opencuts, and has a 1,000′ gravity tram.

Smelter building is 50x60′, with a 200-ton blast-furnace, which was in blast only 120 hours, after an expenditure of £7,000. Ore was estimated, by alleged careful sampling, to carry 3% copper, but smelting returns were under 1% copper. Smelted 800 long tons of ore to obtain 6¾ tons of copper. Mr. Rae says the mine is worthless, and is accused, by directors, of making misleading reports. Idle since May, 1908. Company in debt, and bankruptcy apparently inevitable.

COMPAÑIA MINERA DE COLLAHUASI. **CHILE.**

Office: Iquique, Chile. Mine office: Collahuasi, Tarapacá, Chile. Bartolomé Novoa, general manager. Lands, 28 claims, area 140 hectares, lying near the peak of the Cerro de Collahuasi, at an elevation of 4,480 meters above sea-level. Lands include various mines, deepest workings being 426′, carrying fissure veins in porphyry having an oxidized zone of about 100 meters depth, which shows argentiferous copper ore averaging nearly 20% in tenor, succeeded by chalcopyrite. At beginning of 1907 ore in sight was 85,791 short tons, estimated to average 27.2% copper; on the floors and dumps were 25,866

tons, estimated to average 13.6% copper, a total of 111,657 short tons, with general average tenor of 24% copper.

Principal property is the Pergolesi mine, having 8 levels opened on th Pergolesi and Delirio veins, showing ore of high average tenor.

The Don Eduardo mine has a 36′ ore body, claimed to average 30% coppe on the third level, which seems almost impossible, but the statement is full vouched for by authorities of excellent standing. On the second level nort the Don Eduardo has various veins of 3′ to 4′ thickness, giving average assay of 66% copper, presumably from massive chalcocite.

The San Nicolás mine has 2 levels opened, showing ores averaging 20% copper, with rich bunches up to 50% in tenor, in a vein of 16″ to 8′ width.

The Anita mine shows ore up to 50% copper tenor in rich chutes, wit long stretches of barren ground intervening.

The Tiuque mine shows various small stringers of ore and has a vertic shaft which will cut the Tiuque vein at a depth of circa 45 meters.

The Esperanza mine has the Empalme shaft of 3x5 meters section, an plans sinking a new shaft 250 meters to the south.

The Sud-America mine has a 42′ main shaft, showing a little ore.

Transportation formerly was by llamas to Carcote, nearest railroad st tion on the Ferrocaril Onera i Antofagasta, but the Ollagüe i Collahuasi railw was nearing completion at last accounts.

To end of 1903 the property produced circa 5,000 tons of ore averaging 3 copper, 600 grams silver and 2.3 grams gold per metric ton. Production, l half of 1906, was 4,218 short tons of ore, ranging 20 to 30% in cop tenor, of which 1,637 short tons were shipped, balance being held at mi Production, 1907, estimated at 1,750,000 lbs. fine copper. Is a property exceptional promise.

COLLAHUASI SYNDICATE, LTD. CHIL

Dead. Was organized Feb. 23, 1904, and reorganized Apr. 4, 1905, as Co pañía Minera Poderosa de Collahuasi. Formerly at Collahuasi, Tarapacá, Ch

COLOMBIA GOLD & COPPER CO. COLUMB

Office: 71 Broadway, New York, N. Y. Thos. E. Moffat, president. C italization $125,000, shares $10 par. Lands are sundry undeveloped gove ment concessions in the Republic of Colombia. Apparently company ne made any effort to develop ore, and is regarded as a mere bit of stock-jobb

COLONIAL COPPER CO. NOVA SCOTIA & ONTAR

Office: 716 Law Bldg., Baltimore, Md. Mine office: Cape D'Or, Cumb land Co., N. S. David H. Carroll, president; W. J. Sneeringer, vice-preside Frederick B. Beacham, secretary; Fletcher B. Speed, treasurer. Organi Jan. 19, 1899, under laws of West Virginia, with capitalization $5,000,000, sha $1 par; issued circa $3,700,000. Bonds, $300,000 authorized, at 6%; issu $140,000. Annual meeting, first Tuesday after first Monday in February.

Lands, circa 2,000 acres, well timbered, and circa 500 acres miscellane lands, showing 6 ore bodies, reported as fissure veins in Triassic trap, and c tacts between trap and conglomerate, with nearly vertical dip, 3 deposits be more or less developed, one, of 25′ reported average width, said to be tracea circa 6,500′, having a 500′ incline shaft and 2 vertical shafts, showing nat copper, formerly reported as of 2.5% average tenor, but now reported company as averaging 1% copper only.

There are 3 large and 6 small hoists, 3 small Rand air-compressors about 20 small mine buildings. There is a 300 h. p. equipment at the m with 150 h. p. at the mill.

A 400-ton concentrator, circa 100x300′ in size, has Blake crushers, rolls 15 jigs, and is connected with the mine, 1½ miles distant, by a 36″ narr

ge railway. Nearest railway is 30 miles, but property is located on the Bay Fundy, with good shipping facilities by water.

Company also owns the New Annan mine, carrying sulphide ore in lenses, d the Chandos mine, in Peterboro county, Ontario, latter showing a 4′ vein, id to assay 5% copper, both idle for some years.

Operations were suspended December, 1907, but company plans resumption. roduction of mine has been about 40 tons fine copper, secured in the course development.

OLONIAL COPPER CORPORATION, LTD. **AUSTRALIA.**

Office: 615 Salisbury House, London, E. C., Eng. Mine office: Lithgow, obinson Co., N.S.W., Australia. Geo. Hardie, chairman; C. P. Oswald, secre ary, J. Wills, mine manager. Organized March 29, 1899, under laws of Great ritain, with capitalization £125,000, shares £1 par; issued, £102,507. Lands, 3 acres, freehold, including the Cow Flat mine, 20 miles from Lithgow. Idle me years.

OLONIAL MINING CO. **ARIZONA.**

Mine office: Ehrenburg, Yuma Co., Ariz. Louis S. Judd, manager. Has rgentiferous and cupriferous cinnabar, assaying up to 7% copper, 30% mercury nd 150 oz. silver per ton. Has gasoline power and a 30-ton Scott furnace.

INA COLORADO. **MEXICO.**

Office: care of Independence Grove, owner, Guadalajara, Mexico. Lands, 0 hectares, on the Rio Palmarejo, circa 12 miles west of Ameca, Jalisco, Mex o, showing a vein of about 6′ width, carrying auriferous and argentiferous opper and iron sulphides, opened by a 700′ tunnel. Idle.

INA COLORADO. **MEXICO.**

Office and mine: care of Don Carlos Yanes, owner, San Javier, Alamos, onora, Mex. Idle.

OLORADO-BOHEMIA MINING & MILLING CO. **COLORADO & OREGON.**

Office: 15 William St., New York, N. Y. Albert Hawkins, president; S. B. ratter, secretary and treasurer. Organized under laws of Colorado, with cap talization $1,250,000, shares $1 par. Property claimed is sundry gold and cop er claims, located in various districts of Oregon and Colorado. No traces of ands, and no traces of operations.

OLORADO & CONNECTICUT GOLD MINING CO. **COLORADO.**

Office: 35 Wall St., New York. Wm. Garlick, president; Col. John A. Thompson, vice-president; A. S. Garlick, secretary. Organized 1902, under laws f South Dakota, with capitalization $40,000, shares $5 par, non-assessable. Lands, 3 claims, area 21 acres, known as the Dolly Varden mine, in the Galena istrict of Hinsdale county, Colorado, showing three 2′ fissure veins, giving ssays of 9 to 19% copper, with good silver values, from chalcopyrite, tetra hedrite and occasional argentite, opened by a 50′ shaft and an 800′ tunnel. ompany's prospectus quotes Edwin J. Hulbert as predicting (in 1879) that this roperty will equal the Calumet & Hecla as a dividend-payer. The report by r. Hulbert is a most remarkable document, but not especially calculated to spire confidence in the property by reason of the ridiculous comparisons ade. Idle.

OLORADO CONSOLIDATED MINING CO. **COLORADO.**

Dead. Formerly at Cochetopa, Saguache Co., Colo. Described Vol. VI.

OLORADO COPPER CO. **COLORADO.**

Dead. Was a swindle, perpetrated by the notorious Wm. F. Wernse gang, f St. Louis.

OLORADO COPPER CO. **NEW MEXICO.**

Dead. Formerly at Clayton, Union Co., N. M. Described Vol. VI.

COLORADO COPPER MINING CO. COLORADO

Office: Salida, Colo. Mine office: Copperfield, Frémont Co., Colo. Organized under laws of New Mexico, with capitalization $5,000,000. Was promoted by W. C. Calhoun, of Denver, one of the most notorious mining swindlers now out of jail. Apparently is a mere bit of stock-jobbery.

COLORADO COPPER SYNDICATE, LTD. COLORADO

Dead. Voluntarily wound up, April, 1901.

COLORADO-ELY COPPER CO. NEVADA.

Mine office: Ely, White Pine Co., Nev. Capitalization $1,000,000, shares $5 par.

COLORADO GOLD-COPPER MINING & TUNNEL CO. COLORADO.

Dead. Organized 1901, and was succeeded by Ouray Consolidated Mining Co. Formerly at Ouray, Ouray Co., Colo.

COLORADO MINE. MONTANA.

Owned by Trenton Mining & Development Co.

COLORADO MINING & DEVELOPMENT CO. MONTANA.

Dead. Title changed, 1904, to Wickes-Corbin Copper Mining Co. Formerly at Corbin, Jefferson Co., Mont.

COLORADO MINING & SMELTING CO. COLORADO

Letter returned unclaimed from former office and mine, Cañon City, Frémont Co., Colo. H. C. Tabor, general manager. Lands were in the western part of Frémont county, Colorado.

COLORADO MINING & SMELTING CO. MONTANA.

Dead. Succeeded, 1905, by Trenton Mining & Development Co. Formerly at Butte, Silver Bow Co., Mont.

COLORADO RIVER & ELY COPPER CO. CALIFORNIA.

Mine office: Klinefelder, San Bernardino Co., Cal. Organized 1906, under laws of Arizona, with capitalization $1,000,000. Lands are the Desert Light and Big Foot groups, 4 miles from Klinefelder.

COLORADO RIVER GOLD & COPPER CO. CALIFORNIA.

Office: 511 Bradbury Bldg., Los Angeles, Cal. Mine office: Parker, Yuma Co., Ariz. Geo. E. Bouton, president; J. L. Curtis, vice-president; E. S. Gannon, secretary and treasurer; T. M. Brennan, general manager; preceding officers, C. F. Gray, J. P. Elms and E. W. Peck, directors. Organized July 1, 1903, under laws of Arizona, with capitalization $1,500,000, shares $1 par; issued $1,230,000. Annual meeting, first Monday in January.

Lands, 10 claims, area 200 acres, and a 5-acre smelter site, in the Monumental district, 10 miles from the Arizona & California Railway, showing 3 ore bodies, occurring as fissures in altered granite, quartz-porphyry and limestone, one vein of 12″ to 30′ width, traceable circa 6,000′, being opened by 7 pits, shafts of 120′ and 140′, and 4 tunnels, of 15′ to 310′ length, with 1,400′ of workings, estimated to show 20,000 tons of ore, with 12,000 tons blocked out for stoping. Ore is oxidized for shallow depth, succeeded by chalcopyrite said to give average assays of 8% copper, 1 oz. silver and $1 gold per ton. Has river transportation to the camp. Company plans deepening shaft to the sulphide ore zone.

COLUMBIA RIVER MINING & DEVELOPMENT CO. CALIFORNIA.

Letter returned unclaimed from former mine office, Needles, San Bernardino Co., Cal. Lands are 4 miles from Mount Whipple, near Echo Bend, at the junction of the Bill Williams Fork river with the Colorado river, showing a promising outcrop giving fair assays in gold and silver.

COLORADO & SONORA MINING CO. MEXICO

Mine office: La Cananea, Arizpe, Sonora, Mex. Benj. M. McCloskey superintendent. Presumably idle.

COLORADO SPRINGS COPPER MINING & TUNNEL CO. **COLORADO.**

Dead. Lands sold, January, 1906, to Michigan-Colorado Mining & Milling Co. Formerly at Florissant, El Paso Co., Colo.

COLOSSAL GOLD & COPPER CO. **UTAH.**

Letter returned unclaimed from former office, care of Wallace W. Wait, Salt Lake City, Utah. Organized August, 1902, under laws of Utah, with capitalization $600,000. Lands included the C. M. C. group, in Beaver county, Utah. Idle and apparently moribund.

COLUMBIA BUTTE MINING & MILLING CO. **MONTANA.**

Office: Butte, Silver Bow Co., Mont. Mine office: Whitehall, Jefferson Co., Mont. J. L. Howard, general manager. Organized 1908, under laws of Montana, with capitalization $100,000, shares 50 cents par. Lands, 8 claims, freehold, circa 6 miles northeast of Whitehall, having a crosscut tunnel and a 140′ shaft showing a little gold ore.

COLUMBIA COPPER CO. **ARIZONA.**

Dead. Lands sold, under judgment for $4,000. Formerly at Globe, Gila Co., Ariz.

COLUMBIA COPPER CO. **MEXICO.**

Dead. Property was sold, 1906, to Greene Gold-Silver Co. Formerly in state of Chihuahua, Mexico.

COLUMBIA COPPER CO. **NEW MEXICO.**

Office: Guaranty Trust Bldg., El Paso, Tex. Mine office: Santa Rita, Grant Co., N. M. Colonel Lewis, president and general manager; Martin Fishback, vice-president; Samuel W. Biggs, secretary and assistant manager; Eugene E. Neff, treasurer; preceding officers, Jas. A. Carroll, Winchester Cooley and Geo. J. Wolfinger, directors; F. O. Wills, mine superintendent. Organized 1906, under laws of New Mexico, with capitalization $1,000,000, shares $1 par. Annual meeting, second Monday in July. Rio Grande Bank & Trust Co., El Paso, registrar.

Lands, 35 claims, area 700 acres, in 4 groups. The Gallinas group, 10 claims, 5 patented, 7 miles from Gallinas, in the Gallinas Mountains, has a 200′ shaft, with 700′ of workings, showing argentiferous copper and lead ores.

The Clearwater group, 4 claims, 2 patented, near Santa Rita, held under a two-year bond and lease, includes the Clearwater mine, having a new 3-compartment shaft, with hoist good for 1,000′, with circa 1,000′ of workings, showing considerable ore of 4 to 6% copper tenor.

The Columbia group, 9 claims, in Good Fortune Cañon, San Andres Mountains, circa 10 miles north of Three Rivers, has a 300′ tunnel and a 52′ shaft, showing oxidized ores giving average assays of 6.45% copper and 1 oz. silver per ton, and several carloads of ore have been shipped.

The Iron Mask group, 10 claims, in the White Mountains, near the Mescalero Indian reservation, shows a limonite gossan, apparently of commercial grade for iron ore, carrying traces of copper and silver.

Company employs 15 men, in development work, and shipped, 1907, a little ore from the Santa Rita properties. Officers are men of good standing.

COLUMBIA COPPER MINING CO. **ARIZONA.**

Dead. Formerly at Clifton, Graham Co., Ariz.

COLUMBIA COPPER MINING CO. **ARIZONA.**

Dead. Merged circa 1903, in Consolidated King Development & Columbia Copper Mining Co. Formerly at Jerome, Yavapai Co., Ariz.

COLUMBIA COPPER MINING CO. **BRITISH COLUMBIA.**

Dead. Formerly at Princeton, Boundary district, B. C. Described Vol. VI.

COLUMBIA COPPER MINING CO. **UTAH.**

Dead. Lands sold, 1903, to Ohio Copper Co. Formerly at Bingham Canyon, Salt Lake Co., Utah. Fully described Vol. III.

COLUMBIA COPPER MINING CO. WASHING

Office: 1014 Spafford Ave., Spokane, Wash. Mine office: Conco Okanogan Co., Wash. E. P. Wheeler, president; W. D. Scott, vice-presi preceding officers, R. L. Campbell and G. W. Dickinson, directors. Orga March, 1904, under laws of Washington, with capitalization $1,000,000, s $1 par; issued, $615,000. Lands, 100 acres, well timbered, showing bodies, largest of 9′ estimated average width, also a low grade dyke of 300′ width, former giving ores, mainly bornite, assaying 5 to 6% copper, traces of silver and $3 to $18 gold per ton. Has shafts of 30′ and 40′ and nels of 110′ and 200′. About $15,000 has been expended on the property.

COLUMBIA COPPER MINING CO. WYOM

Mine office: Holmes, Albany Co., Wyo. At last accounts was in l tion with the Duchess Mining, Milling & Smelting Co.

COLUMBIA GOLD & COPPER CO.

Office: 27 Central St., Boston, Mass. Location of lands, if any, unkn

COLUMBIA GOLD & COPPER MINING & SMELTING CO.

Mine office: Rosalia, Whitman Co., Wash. Idle and apparently morib

COLUMBIA MINE. NEVA

Mine office: Goodsprings, Lincoln Co., Nev Lands, 6 claims, form owned by Columbia Mining Co., said to show a 30′ vein averaging 15% co which is an overestimate all around, the carbonate and oxide ores carr about 10% copper and up to $10 gold per ton. The Extension vein, 3′ wid opened to a depth of 230′. Mine has about 1,800′ of workings. Propert considered promising.

COLUMBIA MINING CO. CALIFOR

Dead. Formerly at Needles, San Bernardino Co., Cal. Described Vol.

COLUMBIA MINING CO. NEVA

Dead. Formerly at Goodsprings, Lincoln Co., Nev.

COLUMBIAN COPPER CO. ONTA

Office: care of Hunt & Sutherland, Chamber of Commerce Bldg, troit, Mich. Property supposedly is in the Georgian Bay district of Alg Ontario.

COLUMBIA RIVER GOLD MINING CO. WASHINGT

Mine office: Kettle Falls, Stevens Co., Wash. Col. J. M. Fish, presi and general manager. Lands, 9 claims, on Gold Hill, opened by a tunnel a 350′ shaft, with about 2,000′ of workings. Shaft shows a vein 5′ wid surface, 12′ wide at 200′ depth and 43′ wide on the 350′ level, at latter d carrying a paystreak of 3′ width. Company is said to have expended a $65,000 on the mine. Has a 50-h. p. gasoline engine and a 3-drill air-pressor. Small sample shipments, 1905, gave returns of 22% copper, 3 oz. s and $4.60 gold per ton.

COLUMBUS-BUTTE MINING CO. MONTA

Dead. Lost option, 1906, on Jennie Dell mine and adjoining cla Formerly at Butte, Silver Bow Co., Mont. Fully described Vol. VI.

COLUMBUS CONSOLIDATED MINING CO. UT

Office: 37 Commercial Blk., Salt Lake City, Utah. Mine office: Salt Lake Co., Utah. Anthony O. Jacobson, president; Dr. W. R. Ha vice-president; S. A. Whitney, secretary and treasurer; preceding officers, L A. Jeffs and Chas. A. Walker, directors. Organized 1902, under laws of U and capitalization increased, 1904, to $1,500,000, shares $5 par. Beg terly dividends January, 1907, with a 15 cent disbursement, follow cent dividends in April and July, 1907, after which dividends we total dividend disbursements, 1907, being $212,623.50. Company e with a debit balance of $9,841, having been caught badly by the l in the metal market.

Lands, 17 claims, area 275 acres, on both sides of Little Cottonwood Cañon, mainly on Old Flagstaff Hill, showing 3 fissure veins and contact deposits, 6 said to average 12′ width. Principal ore body, known as the Braine fissure, of circa 12′ average width, has been reached by 2 tunnels, [illegible] apart, practically on the same level, mine being opened by 4 shallow shafts and 4 tunnels, latest, a drainage tunnel, started 190[illegible], circa 4,000′ down the cañon, being planned to unwater the Columbus Consolidated and adjoining properties. Mine has about 3 miles of workings, new openings, 1907, being [illegible]. No. 3 shaft, in 1907, showed, on the 110′ level, a large body of sulphide ore ranging 5 to 15% in copper tenor. Principal ore bodies are fissures and contacts in limestone and quartzite, with highly mineralized sections of 30′ to 100′ width and several hundred feet length, carrying [illegible] and smelting ores, latter ranging up to 8% copper, 18% lead, 15% zinc, 30 oz. silver and $4.50 gold per ton. Ores are carbonates at and near surface, succeeded by sulphides. Some trouble was had, 1908, with water from underground sags. It is planned deepening the main shaft to 1,500′. The Holland and Columbus tunnels are connected on the Braine fissure, and the Holland tunnel has electric tramline. Production is divided into 3 classes, first being copper ore, second silver-lead ores and third concentrates.

A Pelton water-wheel works under a head of [illegible], taking water through a 20″ and 22″ steel pipeline, of 4,500′ length, developing [illegible] h.p., which is transformed into electricity by two 300-kw. dynamos and carried to the mine by a 4½-mile transmission line. Foundations are in for a second wheel of the same size. At the mine there are four [illegible] h.p. boilers, good for 200 each, 10-drill Nordberg and 5-drill Ingersoll-Sergeant air-compressors, machine shop and a sawmill.

The concentrator, of 150 tons daily capacity, was built from material secured out of two old 100-ton mills. Equipment includes a Gates gyratory crusher, 2 sets of Rogers rolls, six 3-compartment jigs and 7 Wilfley tables. Mill puts about 4 or 5 tons into 1, and concentrates are shipped to smelter at Murray, for smelting.

The mine being located in a very rugged district, transportation facilities are poor, but have been much improved by a new wagon road during 1907, from the loading station to the railroad.

Production, 1907, was 6,865 wet tons, or 6,089 dry tons [illegible], yielding $259,359, or $38.77 per ton, in addition to [illegible] ore that gave average returns of $11.38 per ton. Production was suspended late 1907, and resumed circa April, 1908. The Columbus is a valuable property, though dividend disbursements [illegible] The company was caught badly by the 1907 slump in the [illegible]

COLUMBUS EXTENSION MINING CO.

Office: care of Anthony O. Jacobson, [illegible], Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. [illegible] acres, near the Columbus Consolidated, having [illegible] ing by a new tunnel, begun May 20, 1907, [illegible] by Columbus Consolidated and Columbus [illegible]

COLUMBUS-WEDGE MINING CO.

Dead. Was succeeded, circa 190[illegible], formerly at Alta, Salt Lake Co., Utah.

COLUSA-LEONARD EXTENSION [illegible]

Office and mine: Butte, Silver [illegible] dent; Meyer Gensberger, vice-president [illegible] secretary. Organized Oct. 1, 190[illegible] 6,000,000 shares $5 par. [illegible] and transfer agent. Lands [illegible]

ing practically a parallelogram, some distance east of the Colusa and Leon mines of the Boston & Montana and about 2,000′ east of the Minnie He mine of the Butte Coalition, being near the Pittsburg & Montana. Has 800′ 3-compartment shaft, planned to be sunk to 1,500′, on the Little M Queen claim, lying about the center of the group. Shaft has cut several su stringers of ore assaying up to 9% copper, but none of commercial size, has a 7′ vein of 2% ore carrying a 14″ paystreak said to range 8 to 10% copper tenor, with small gold and silver values and some lead and zinc. Ju ing from neighboring properties on the east, ore will be found at consider depth, if at all. Shaft was sunk on record time. Equipment includes a g air-compressor and temporary hoist, and the company was said to have dered a 5-ton Nordberg first motion hoist, good for 2,000′. Mine is said to h a 400-gallon electric pump. Was promoted by same people who put out Emma Mining & Development Co., which was a failure; the Reins Copper which is in doubt, and the Butte & London Mining & Development Co., wh also is in doubt. An attempt to place shares in London was not success Idle at last accounts.

COLUSA-PARROT MINING & SMELTING CO. MONTA

Office and works: Butte, Silver Bow Co., Mont. Hon. Wm. A. Clark, pr dent; Arthur H. Wethey, vice-president and general manager; W. M. Bickf secretary; Fred Pratt, mill superintendent; David Mathews, smelter supe tendent. Organized Nov. 26, 1897, under laws of Washington, with capital tion $500,000, shares $50 par. Has paid dividends, to the end of 1906, $2,080,000, and surplus, Jan. 1, 1907, was $1,391,656.

Property is a concentrating and smelting plant, known as the Butte duction Works, on the flat south of Butte, overhauled and largely rebu 1905-1906, at a cost of circa $300,000, and partially destroyed by fire Fe ary, 1906, after which again thoroughly rebuilt.

The 1,000-ton concentrator puts 4 tons into one. Equipment include 15x24″ Blake crusher, five 9x15″ crushers, ten 6′ Chilean mills, nine 16x Cornish rolls, 62 two-compartment and 3-compartment Hartz jigs and 76 Wil tables. Concentrates carry 15 to 20% silica.

The smelter has 5 Wethey and 2 McDougall calciners. Crude ore fines mixed with concentrates, and the roasted product carries 5 to 7% sulp only. High-grade ore requiring no concentration is desulphurized by k roasting, going thence to the blast-furnaces. There are two 150-ton blast-f naces and three 80-ton 20x60′ reverberatory furnaces. Waste gases from reverberatories are utilized for power purposes. The main dust-chamber, to 80′ wide, 30′ high and 360′ long, has brick walls and sheet steel roof. smelter has the largest concrete stack ever built, this being 352′ 7″ high, w a uniform diameter of 18′ from top to bottom. Material required for t stack included 60 tons of steel, 1,500 barrels of Portland cement and 1,400 t of sand. The foundation, 100′ square and 3′ deep, weighing 12,800 tons, made of molten slag, in solid blocks, interlaced with 70 tons of scrap iron steel, leading from the base into the bottom of the stack. Above the foun tion of slag is a solid block of concrete, 42′ 6″ square, 5′ high at the sides 8′ 6″ high in the center, with four layers of 1¼x1¼″ "T" iron, also 500 b of the same size "T" steel, radiating in a circle from the chimney openi The stack was built at the rate of about 30′ per week.

The converter building, 100x225′, of steel, has 2 stands, with room fo third, and six 84x126″ shells, electrically rotated. These works treat ores of the Original Consolidated Mining Co., and are modern and efficie with a capable management.

COMANCHE CONSOLIDATED COPPER CO. NEW MEXI

Office: 1201 Alaska Bldg., Seattle, Wash. Mine office: Fairview, Sierra

City, Grant Co., N. M. S. S. Curry, president; Geo. J. Binstorf, vice-dent; Hugh F. Ellard, secretary; Carl Landsee, treasurer; Hon. E. A. e, trustee. Organized 1902, under laws of Arizona, with capitalization ,000, shares $1 par.

ands, 38 claims, area 760 acres, with sundry ranch and orchard lands, ling the Burro Mountain and Pinos Altos groups, in the Burro Mountains, 13 miles from Silver City. Mines are the Hearst, Pacific, Kept Woman, te and Oquawka, also the Iron Mountain mine of hematite, used for g ore.

he Burro Mountain group shows 3 lenses, carrying oxide, carbonate and e ores, said to give average assays of 5 to 8% copper, with only nominal nd silver values, with indications of sulphides at a little greater depth. he Pinos Altos mines were considerable producers for some years, under wnership and management of the late Senator Hearst. The group shows re veins, opened by 4 shafts of 400' to 700' depth. The Gillette is the working shaft. Ores are cuprite, malachite, azurite and chysocolla in the workings, with sulphide ores below that give returns up to 3% copper, silver and $7 gold per ton, with occasional zinc up to 20% in tenor. The Altos group has large bodies of low-grade ore developed.

he mines and works are connected by a 13-mile narrow-gauge railway, Pinos Altos to Silver City, built 1905-1906.

he reduction plant, replacing the old works, burned 1903, includes a trator 1,500' west of the smelter, having magnetic separators for the tion of zinc.

he smelter has 250-ton and 300-ton blast-furnaces, with converter turn-t blister copper of 98% tenor, including 150 oz. silver and 10 oz. gold a, silver and gold being secured mainly from custom ores. Slag losses 1.25% copper. The reduction works includes a briquetting plant, ma-hop, iron foundry, smithy, electric light plant, office building and a r of dwellings for employes.

he company came to grief, late 1907, when an attempt was made to 1 10-cent voluntary assessment, which was not paid—such assessments are. A receiver was appointed, December, 1908, the company's debts ing to $402,096. Property has been idle since late in 1907, but, in Octo-08, plans were under way for a merger of the Comanche with the Cop-er Mining Co., under title of Savanna Copper Co.

COMMERCE GOLD & SILVER MINING CO. ARIZ

Dead. Formerly at Duncan, Graham Co., Ariz.

COMMERCIAL CORPORATION, LTD. SE

Office: 4 Union Court, London, E. C., Eng. Spanish general office: P 2, Barcelona, Spain. Mine office: Huercal-Overa, Almería, Spain. Jas. lor, chairman; Henry R. Gardiner, secretary. Organized May 10, 1897, u laws of Great Britain, with capitalization £500,000, in £494,000 ordinary £6,000 deferred shares of £1 par; issued, £302,000 ordinary and £4,100 defe Property is sundry lands carrying copper, nickel and cobalt ores, in proce development at last accounts.

COMMERCIAL MINING CO. ARIZ

Office: Prescott, Ariz. Mine office: Maxton, Yavapai Co., Ariz. Lan the Copper Basin, are extensively developed, and considerable production secured by leasers, 1907, output being 694,126 lbs. fine copper.

COMMODORE COPPER MINING CO. WYOM

Dead. Formerly at Encampment, Carbon Co., Wyo.

COMMODORE MINES, LTD. BRITISH COLUM

Letter returned unclaimed from former office, Vancouver, B. C. office: Van Anda, Texada Island, B. C. Bruce Kirk, chairman; H. W. Pe secretary; W. Thos. Newman, manager. Organized June 20, 1902, under of British Columbia, with capitalization $750,000, shares $10 par.

Lands, near the Marble Bay mine, show 3 veins that can be worked the same set of openings, there being a 2-compartment 200′ main shaft, about 2,000′ of workings. Development is on the main or contact vei tween limestone and eruptive rocks, showing argentiferous and auri chalcopyrite, associated with sphalerite and galena, of good average Equipment includes a 16-h. p. Jenckes hoist, Cameron sinking pump, d Morris station pump and several mine buildings. Employed 12 men, half of 1907. Property considered promising.

COMMONAGE COPPER SYNDICATE, LTD. TRANSV

Office: 8 Bain's Bldgs., Johannesburg, Transvaal. Mine office: Upi Transvaal. H. Southcott, secretary; Chas. O. Bain, David Poole, E. Pa E. J. Pullinger and W. J. Holmes, directors. Organized July, 1908, under of Transvaal, with capitalization £3,000, shares £1 par. Lands, circa acres, in 2 equal tracts, with privilege of 99-year lease on the basis of 1 gross value of output, also 2 options of 7,750 morgen each on the Bet group, having 7 miles of frontage on the Orange river, showing a vein o to 24″ width, traceable circa 1,000′, giving samples of ore assaying 15% c and 14 dwts. silver per long ton.

COMMONWEALTH MINES CO. U

Office: care of Newton A. Dunyon, Salt Lake City, Utah. Mine Milford, Beaver Co., Utah. Wm. M. Bradley, vice-president; W. T. Aiken retary and treasurer; preceding officers, C. H. Strevell and Jas. H. Pat directors. Organized November, 1906, under laws of Wyoming, with capit tion $600,000, shares $1 par. Lands, 7 claims, in the Star district, adjoini Hub property on the east, and near the Burning Moscow mine, suppos carry the extension of ore bodies of the Cactus mine. Considerable le was produced from surface workings, in the past, and the Nellie claim copper sulphides at bottom of workings. Property shows a broad contact between granite and porphyry, intersected by 6 cross-fissures showing assaying well in copper, lead and silver. The Beaver claim shows ores g average assays of 13.2% copper and 17.2 oz. silver per ton, with more o lead. Property considered promising.

COMMONWEALTH MINING CO. ME

Office: Boston, Mass. Mine office: Ocotlán, Ocotlán, Jalisco, Mex. I

23 acres, known as the Humboldt mine, having a 42′ crosscut shaft on a 12′ vein giving assays up to 6% copper, 62% lead, 500 grams silver and 6 grams gold per metric ton.

COMPTON COPPER CO. **ARIZONA.**

Dead. Property was the House mine, circa 30 miles south of Casa Grande, having a 65′ shaft, with gasoline power. Formerly at Casa Grande, Pinal Co., Ariz.

COMORA MINING CO. **IDAHO.**

Mine office: Kelton, Box Elder Co., Utah. E. Rammelmeyer, superintendent. Lands, in Cassia county, Idaho, show argentiferous and auriferous lead and copper sulphides, mainly former, galena assaying up to 79% lead, 119 oz. silver and $1.20 gold per ton. Has a 250′ shaft with about 600′ of drifts, on a 6′ vein carrying a 12″ paystreak of massive galena. Wagon freight to Kelton is $7 per ton.

COMSTOCK COPPER MINING CO. **IDAHO.**

Office: care of John H. Nordquist, Wallace, Idaho. Mine office: Burke, Shoshone Co., Idaho. Organized under laws of Idaho, with capitalization $1,500,000, shares $1 par. Lands are on Baldy Mountain, east of Burke.

COMSTOCK COPPER MINING SYNDICATE. **AUSTRALIA.**

Mine office: Gloucester, N. S. W., Australia. W. J. Gillam, secretary. Capitalization £30,000. Has received a government grant in aid of prospecting. Lands, circa 30 miles from Gloucester, show a 6′ vein, opened by a 55′ shaft and a 100′ tunnel, exposing high grade carbonates, with sulphide ore at shallow depths, giving assays up to 23.61% copper, 21 oz. silver and 3.7 dwts. gold per long ton. Is supposed to be building a small smelter.

COMSTOCK MINE. **WYOMING.**

Office and mine: Hecla, Laramie Co., Wyo. Martha Ferguson, owner. A. H. Lindsey & Co., lessees, at last accounts. Has a 150′ shaft and a 300′ tunnel, showing small bunches of chalcocite.

COMSTOCK MINING CO. **WYOMING.**

Dead. Formerly at Encampment, Carbon Co., Wyo. Fully described Vol. VI.

COMPAÑIA MINERA CONCEPCIÓN DEL ORO. **MEXICO.**

Mine office: Concepción del Oro, Mazapil, Zacatecas, Mexico. Santiago Chamberlain, president; J. L. Kowalski, secretary and general manager; Santiago Chamberlain, Jr., superintendent; Juan Sanchez, mining captain. Organized 1902, with capitalization $30,000, shares $30 par. Lands, 32 pertenencias, area circa 80 acres, in the Mazapil district. A 4′ vein carries oxide ores carrying 30% copper, with gold and silver values. Shaft, 33 metres. Ore is shipped 336 miles to smelters at San Luis Potosí. Has gasoline power.

GEWERKSCHAFT CONCORDIA. **GERMANY.**

Mine office: Herdorf, Rheinprovinz, Germany. Was a very small producer of copper ore at last accounts.

COMPAÑIA MINERA CONCORDIA DE COLLAHUASI. **CHILE.**

Office: Iquique, Chile. Mine office: Collahuasi, Tarapacá, Chile. Organized March 17, 1906, under laws of Chile, with capitalization 120,000 pesos, shares 100 pesos par. Property is the Concordia mine, undergoing development.

CONCRETE GOLD MINING CO. **COLORADO.**

Office: 324 Cooper Bldg., Denver, Colo. Mine office: Central City, Gilpin Co., Colo. Saml. V. Newell, superintendent, at last accounts. Ores carry gold, silver, lead and copper. Has steam power. Presumably idle.

COMPAÑIA MINERA CÓNDOR DE COLLAHUASI. **CHILE.**

Office: Iquique, Chile. Mine office: Collahuasi, Tarapacá, Chile. Organized July 4, 1906, under laws of Chile, with capitalization £50,000, shares £5 par.

COMPAÑIA MINERA DE CONDORIACO.

Mine office: La Serena, Coquimbo, Chile. Has steam power and about 75 men at last accounts. Presumably idle.

CONFEDERATE MINING CO.

Office: care of Col. Lee Crandall, president, Washington, D. C. M Crabb, secretary and treasurer; Carl Crandall, manager. Organized 1901, under laws of Arizona, with capitalization $1,000,000, share Property is the Candelaria group, on Reno Mountain, Maricopa county opened by shafts of 30′, 60′ and 64′, said to show a 12′ vein of sul carrying a 4′ paystreak, giving assays of 20% copper. Idle for severa

CONGLOMERATE MINING CO.

Office: care of G. Lavagnino, Denver, Colo. Mine office: Binghan Salt Lake Co., Utah. A. P. Hanson, consulting engineer. Idle.

CONGO MINE.

Mine office: Dillon, Carbon Co., Wyo. C. L. Flamme, manager north of Dillon, opened mainly by tunnel to depth of 250′, show a le 40′ in width, carrying a paystreak of about 4′ of concentrating ore. also to have struck a 25′ body of copper ore of good grade. Is said t plate building a small concentrator or matting furnace.

CONGOR GOLD & COPPER MINING CO.

Office: 506 Auerbach Bldg., Salt Lake City, Utah. Mine office: Canyon, Salt Lake Co., Utah. Glen R. Bothwell, president and gen ager; R. C. McConaughy, vice-president; Frank E. Loose, secretary; officers, E. F. Jenkins and C. G. Hall, directors. Capitalization increa from $200,000 to $1,000,000, shares $1 par. Lands, 10 claims, area acres, adjoining the Dalton & Lark mine, with about 400′ of workin ing copper sulphides.

CONGRESO COPPER (MEXICO), LTD.

Office: 134 Salisbury House, London Wall, London, E. C., En Phillips, chairman; Dr. T. R. Marshall, resident managing director; G lock, secretary; Fredk. Swinney, superintendent. Organized June under laws of Great Britain, with capitalization, £20,500, in 20,000 shares, £1 par, and 10,000 deferred shares of 1s. par. Lands, acres, adjoining the Congreso mine. Employed 40 men at last accou

CONGRESS GOLD & COPPER CO.

Office and mine: Silverton, San Juan Co., Colo. J. B. Ross, and general manager; Jacob Ross, vice-president; Frank L. Ross, secr treasurer; preceding officers and Isaac D. Smead, directors; M. E. Rum superintendent. Organized Apr. 16, 1908, under laws of Colorado, italization $500,000, shares $10 par. Bonds, $100,000 authorized, at issued. Lands, 3 claims, area 30 acres, in the Red Mountain distri ing 5 ore bodies, opened by a 350′ shaft, with 1,500′ of workings, ore reported to assay 15 to 20% copper, 5% lead, 5.1% zinc, 8 silver, and 0.5 to 1.5 oz. gold per ton. Property was worked and is said to have produced circa $400,000 in ore. Has a 50-h. plant. Company plans deepening main shaft 100′ and opening the 5 o on one level.

CONGRESS GOLD & COPPER MINING CO.

Letter returned unclaimed from former office, Spokane, Was office: Keller, Ferry Co., Wash. Joseph Roslow, president; J. Good retary. Lands, circa, 80 acres, opened by shafts and tunnels, on 2 vei good assay values in gold, silver and copper, with a little nickel. apparently moribund.

CONQUEST CONSOLIDATED MINING CO. **WASHINGTON.**

Office: 253 Broadway, New York, N. Y. Mine office: Newport, Stevens Co., Wash. Wm. Coverley, president; Robt. Caddock, vice-president; W. C. Ingalls, secretary; A. W. Lindsay, treasurer. Organized under laws of Washington, with capitalization $5,000,000, shares $1 par, as a merger of Conquest Copper & Gold Mining Co. and American Eagle Gold Mining Co. Annual meeting, second Tuesday in November.

Lands, 15 claims, area 300 acres, in the Newport district of Washington and Idaho, showing 7 ore bodies, of which one, under development, 1′ to 6′ wide and traceable circa 2,000′, is opened by a 186′ shaft and by tunnels of 200′, 700′ and 500′, with circa 3,000′ of workings, showing slightly auriferous and argentiferous copper sulphides of concentrating grade, with considerable ore blocked out and on the dump. Has steam power, with hoist good for 1,000′, and several mine buildings. Idle since April, 1907, from lack of cash. Property considered promising.

CONQUEST GOLD & COPPER MINING & MILLING CO. **WASHINGTON.**

Dead. Reorganized, circa 1902, as Conquest Consolidated Mining Co. Formerly at Newport, Stevens Co., Wash.

CONRAD CONSOLIDATED MINE. **AUSTRALIA.**

Dead. Succeeded, 1906, by Conrad Stannite Mines, Ltd. Formerly at Howell, Hardinge Co., N.S.W., Australia.

CONRAD STANNITE MINES, LTD. **AUSTRALIA.**

Office: 13 Austin Friars, London, E. C., Eng. Mine office: Howell, Hardinge Co., N.S.W., Australia. Sir W. L. Young, chairman; R. Randall Stevens, secretary. Organized Feb. 14, 1906, under laws of Great Britain, with capitalization £500,000, shares £1 par; issued £375,000. Lands, 10 leases, area 294 acres, including the Conrad and King Conrad mines, in the parish of Maya. The geology is unusual, country rock being granite carrying a fissure vein at 20″ to 30″ width, without faults, so far as developed. Ore is an intimate mixture of copper, lead and tin sulphides, principal values being in tin. The ores include slightly argentiferous galena, chalcopyrite, stannite and pyrite, with small quantities of sphalerite, stannite being a rather rare member of the pyrite family, carrying circa 27.5% tin, 29.5%, copper, 13.1% iron and 29.9% sulphur. Mine, opened to depth of 400′, has estimated ore reserves of about 200,000 tons. Ore stands well, requiring little timbering.

Ore is hand-sorted at surface before sent to 2 mills using the Wetherill magnetic process. Two classes of concentrates are made, the first being silver-lead, which is easily separated by jigging, the second concentrate consisting of a mixture of copper and tin with a small amount of galena and zinc.

The smelter has a 30-ton water-jacket blast-furnace, 10-ton reverberatory furnace and 3-ton slag furnace for treatment of tin slags. In the blast-furnace the tin and copper separate, product being a white metal carrying mainly copper, with small percentages of tin and lead, bulk of the tin being thrown off in the slags, which are resmelted in the tin furnace. Employs circa 200 men.

COMPAÑIA MINERA LA CONSECUENCIA DE SANTA ROSA. **CHILE.**

Office: Iquique, Chile. Mine office: Santa Rosa, Tarapacá, Chile. Organized Aug. 3, 1904, under laws of Chile, with capitalization, 64,000 pesos, shares 100 pesos par.

CONSERVATIVE MINING CO. **WASHINGTON.**

Office: Snohomish, Wash. Letter returned unclaimed from former mine office, Silverton, Snohomish Co., Wash. Frank M. Evans, president; Hugh Kennedy, secretary and manager. Organized under laws of Washington, with capitalization $200,000, shares 20 cents par. Lands, 10 claims, known as the St. Louis group, 3 miles from Silverton, said by company to show a 15′ vein—

which is called by others a vein of 18" to 36" width—carrying argentiferous auriferous chalcopyrite, assaying up to 20% copper. Idle and apparen moribund.

CONSOLIDATED AFRICAN COPPER TRUST, LTD. **RHODES**

Office: 8 Old Jewry, London, E. C., Eng. Mine office, Bulawayo, Rhodes Dr. Hans Sauer, chairman; preceding officer, J. H. Walker, H. D. Boy E. R. Tymms and J. Seear, directors; P. S. Inskipp, J. D. McDonald and G Mitchell, local committee; Consolidated Gold Fields of South Africa, Lt consulting engineers and secretaries; Cyril E. Brackenbury, general manag

Organized Feb. 17, 1902, under laws of Great Britain, with capitalizati £600,000, shares £1 par, in £50,000 cumulative 7% preference shares a £550,000 ordinary shares; issued, £534,000. The preference shares carry t right, until August, 1910, to purchase one share of Edmundian Copper Mini Co., Ltd., at par. Preference shares are convertible, at option of holder, in ordinary shares at par. On August 7, 1907, company floated the Edmundi Copper Mining Co., Ltd., controlling the latter through ownership of £85,0 in stock, of the capitalization of £135,000, apparently holding all of t present issued stock of the Edmundian.

Lands are 1,587 claims, including 135 in the Lomagunda district, 900 in t Victoria district, 30 in the Kafue district, 20 in the Umtali district, 70 in t Tuli district of Mashonaland, 60 in Bechuanaland, including coal lands. T Mozambique claims, 202½ in number, in Portuguese East Africa, were s to the Edmundian Copper Mining Co., Ltd.

The Alaska mine, 90 miles northwest of Salisbury, shows the second lar est ancient workings in Rhodesia, having ore bodies estimated at 150′ wid and 1,700′ length, which estimate seems high. Numerous drill-cores fr depths of 200′ to 800′ show copper ore, and the company estimates th 150,000 tons of cupriferous schists, of 3% tenor, are exposed above t water-level. Company has expended £13,011 on the Alaska mine, which h been idle some years.

The Umkondo mine, in the Victoria district, 10 miles west of the Sube river, and circa 115 miles east of Victoria, by wagon road, shows ancie workings inferior only to those of the Alaska, extending over 300′ in widt and circa 1,500′ in length, with some open pits of 60′ depth, and small shaf with ore stoped out to the water-level. The Umkondo has been tested e tensively by diamond drill, cores giving average assays of circa 9% copp Several shafts have been sunk, showing 2 veins, with a shallow oxidized zo company estimating reserves at 81,000 long tons of ore at 8.5% avera copper tenor. To June 30, 1907, the company had expended £30,060 development at the Umkondo.

The properties of this company are extensive, and both the Alaska a Umkondo mines are of promise, and management is considered good.

CONSOLIDATED ARIZONA GOLD & COPPER CO. **ARIZON**

Office: Phoenix, Ariz. Mine office: Troy, Pinal Co., Ariz. Property is t Lucky Boy mine, carrying gold and copper ores.

CONSOLIDATED ARIZONA SMELTING CO. **ARIZON**

Office: 1212-71 Broadway, New York, N. Y. John L. Elliott, president; Vogelstein, vice-president; Wm. Schall, Jr., treasurer; preceding officers, Haven, Jr., Chas. J. Peabody, Chas. D. Chapman and Henry A. James, directo J. K. Rice, receiver. Organized 1906, under laws of New Jersey, with ca talization $17,500,000, shares $10 par; issued $16,000,000. Property is practica the entire stock issues of the Arizona Smelting Co. and the De Soto Mining C which are separately described, and it is said that practically the entire st issue of the Consolidated Arizona Smelting Co. is controlled by the Co solidated Arizona Smelting & Securities Corporation.

n Thos. W. Lawson becoming financially interested in this company, tly went bankrupt, in 1907. Assets are figured by court appraisers ,417. Efforts, for nearly a year, to reorganize, have been unsuccessful, company's prospects are not bright.

LIDATED BIG LEAD & CALUMET MINING CO. **ARIZONA.**

e office: Kelvin, Pinal Co., Ariz. Lands include the Calumet mine, have been bought for $40,000 cash, which shipped 147 carloads of ore ugust, 1907. Presumably idle.

LIDATED CENTRAL BUTTE COPPER MINING CO. **MONTANA.**

ter returned unclaimed from former mine office, Butte, Silver Bow Co., Augustus T. Morgan, D. J. Charles, William V. Lalor, Robt. M. Cobban, . Hershey, R. H. Wearing and R. R. Jones, directors. Organized Oct. 27, nder laws of Montana, with capitalization $1,200,000, shares $1 par. are sundry claims near the South Butte, also claims east and west Ophir mine of the Butte Central & Boston. Lands are said to show veins of 1′ to 4′ width. Idle.

LIDATED COPPER CO. **BRITISH COLUMBIA.**

d. Formerly at Ainsworth, Kootenay district, B. C.

LIDATED COPPER CO. **NEVADA & UTAH.**

d. Was organized May, 1907, under laws of Delaware, with capitaliza- 0,000,000, shares $5 par, and name changed, April, 1908, to Copper- o. Formerly at Ely, White Pine Co., Nev.

LIDATED COPPER CO. **OREGON.**

ice: Anderson, Ind. Mine office: Homestead, Baker Co., Ore. Or- Sept. 25, 1905, under laws of Oregon, with capitalization $2,500,000, $10 par, by Wm. Robertson, Wm. Garretson and A. E. Johnson, to copper claims on the Snake river, near Homestead. Idle.

LIDATED COPPER CO., LTD. **CORSICA & MEXICO.**

tter returned unclaimed from former office, Dashwood House, London, Eng. Mine office: Charcas, Moctezuma, San Luis Potosí, Mex. rdon, chairman; S. J. Crouch, secretary; Thos. P. Rowe, manager. Or- June 10, 1899, under laws of Great Britain, as a reconstruction of the onsolidated Mining Co., Ltd., with capitalization £100,000, shares 10s. ands include La Bufa de Charcas and sundry adjoining claims, carry- pper, silver and lead ores, in Mexico, also the Lancone copper mine at Corsica, which has been idle for some years.

OLIDATED COPPER CO. OF LOWER CALIFORNIA. **MEXICO.**

ice: 301 Bradbury Bldg., Los Angeles, Cal. Letter returned unclaimed former mine office, San Quintín, Norte, Baja California, Mex. W. E. n, president; Wm. C. Mullock, vice-president; E. T. Wright, secretary; J. d, treasurer; preceding officers, C. A. Ford, W. I. Hollingsworth, Geo. P. Walter H. Wren and I. L. Pike, directors. Organized 1905, with capi- ion $1,000,000. Lands, 48 hectares, also a 50-acre millsite, lying 4 to es from tidewater, several miles inland from Punta Canoas, below San n. Lands are said to show 18 veins, of 10′ to 50′ width, all carrying ate and oxide ores with quartz gangue averaging better than 6% copper, is manifestly improbable. Mines were claimed by old owners to show ds of 250,000 tons of ore averaging 10% copper, 18 oz. silver, and 15 to gold, which is a self-evident fabrication. Property includes the Julio and Santa María mines, latter said to have a 120′ vein opened by and has wagon roads from principal mines to San Quintín. Mill, rated tons capacity, has 5 Newnham crushers. Property also has a 100-ton g plant.

OLIDATED COPPER CO. OF PARRY SOUND. **ONTARIO.**

ice: 705 Palladio Bldg., Duluth, Minn. Mine office: Parry Sound,

Parry Sound district, Ont. Robt. Forbes, president; Robt. Millard, vice-p ent; J. G. Harris, secretary and treasurer; preceding officers, A. C. Richeux, Frank Cox, M. A. Ryan, Dr. J. D. Budd, F. L. Young and Jackes, directors; John Moffatt, general superintendent. Organized Febr 1902, under laws of Ontario, with capitalization $5,000,000, shares $1 par; is circa $3,100,000. Has no bonds or liabilities.

Lands, circa 1,500 acres, practically all patented, carrying conside standing timber, in Foley, McDougall, Haggerman and Conger towns Property formerly was held by Hattie Belle Gold, Copper & Nickel Co., w claimed 4,000,000 tons of ore in sight, of $10 to $15 average value per which was untrue. Ores occur as contact veins, between slate and quart and as fahlbands, ore being mainly chalcopyrite, with occasional bornite chalcocite, mainly low in grade but with occasional seams of high grade There are 18 different ore bodies, shown by test-pits and stripping, of w 2 are somewhat developed. The fahlbands are said to show a width of than 1,000', carrying 7 bands of fairly good ore, of 200' estimated aggre width, between which is low grade ore, part of which may be amenabl concentration. Ores assay 1.5 to 12% copper, circa 3 oz. silver, and a few cents up to $8 gold per ton. Property has a 180' vertical shaft, about 25 pits of 10' to 30' depth.

The Spider Lake mine has a shafthouse, and steam hoist good for with necessary mine buildings, and a considerable ore body has been ex by trenching.

The Leflex mine has shafts of 90' and 40', showing nothing of parti promise. Surface on the Leflex shows an iron gossan, carrying up to 2% co and $2 to $3 gold per ton. A 600-lb. test shipment, from the 65' level, ret circa 30% copper, and various samples have shown from 0.5% to 3% nickel, from nothing to $20 gold per ton. Property considered promising.

CONSOLIDATED COPPER CO. OF VIRGINIA.

Office: 924-5 Beekman St., New York, N. Y. Franklin Bien, president; T. Coyne, vice-president; Jos. B. Bissell, treasurer; Nathan E. Clark, secre Organized October, 1902, under laws of South Dakota, with capitaliz $100,000,000. Presumably an abortive attempt at some sort of a consolid of existing companies.

CONSOLIDATED COPPER CREEK MINING CO. ARIZ

Office: 707 Shukert Bldg., Kansas City, Mo. Mine office: Mayer, Ya Co., Ariz. E. J. White, secretary, treasurer and manager; F. E. Dobbins I. W. Dumm, fiscal agents; G. W. Lightburn, superintendent. Organized under laws of Arizona, with capitalization $1,000,000, shares $1 par. Co the Consolidated Copper Co. of Colorado, which holds the Delmonico gold at Cripple Creek. Arizona lands, 15 claims, known as the Sunset group joining the Rosalie Copper Co., carrying slightly argentiferous copper with a 100' 2-compartment shaft. Equipment includes a 125-h. p. boiler, S hoist and 8-drill air-compressor. Advertising, largely in the cheap mail monthlies, is of the brazenly fakish sort, calculated to catch the dollars o ignorant. Advertised, 1907, that it was altogether likely to become as fa as Amalgamated, but this impression is not shared generally. Is regarded suspicion.

CONSOLIDATED COPPER DEVELOPMENT CO. NAT

Office: Mutual Bldg., Harrison St., Johannesburg, Transvaal. Mine o Vryheid, Transvaal. Works office: New Clare, Transvaal. Organized September, 1907, under laws of Transvaal, with capitalization £15,400. La near the Umhlatusi river, in the Babanango division of the N'kandhla dist of Zululand, Natal, near the Zululand-Transvaal border, show an extensive of schists, carrying disseminated copper ores below commercial grade, w

commercial ores occurring in contact deposits between granite-porphyry and schist, ore being mainly bornite, with some chalcopyrite, with quartz gangue, the bornite carrying 3 to 27 dwts. gold per long ton.

CONSOLIDATED COPPER-GOLD MINES CO. **CALIFORNIA.**

Office: care of Arthur Philbrick, president, Reno, Nev. Mine office: Quincy, Plumas Co., Cal. John S. E. Houck, secretary and treasurer. Lands, 12 claims, in Genesee Valley and on Copper Hill, in the Ward Creek district, said to show 8 practically parallel veins of 1′ to 30′ width. Has a 30′ shaft, said to be bottomed in a 24″ paystreak of massive chalcocite, and is said to have other openings showing auriferous and argentiferous copper ore of about 7% average tenor. Planned driving a 2,300′ crosscut tunnel to cut veins at depth of 1,500′ and installing a 500-h. p. water plant. Idle and apparently moribund.

CONSOLIDATED COPPER MINING CO. **IDAHO.**

Dead. Succeeded, circa 1904, by Ladd Metals Co. Formerly at Mineral, Washington Co., Idaho.

CONSOLIDATED COPPER MINING & MILLING CO. **MONTANA.**

Office: care of F. D. Willard, secretary, Mullan, Idaho. Mine office: Saltese, Missoula Co., Mont. Company plans developing the Black Traveler vein by a 700′ tunnel.

CONSOLIDATED FLAGSTAFF MINES CO. **UTAH.**

Dead. Was succeeded, April, 1908, by Flagstaff Copper Mines Co. Formerly at Alta, Salt Lake Co., Utah.

CONSOLIDATED GOLD & COPPER CO. **ARIZONA.**

Dead. Was promoted by Douglas, Lacey & Co., notorious swindlers, of 66 Broadway, New York. For methods of these scoundrels see description of Amalgamated Gold & Copper Co. Formerly at Clifton, Graham Co., Ariz.

CONSOLIDATED GOLD & COPPER CO. **MEXICO.**

Dead. Formerly at La Cananea, Arizpe, Sonora, Mex. Described Vol. VI.

CONSOLIDATED GOLD, COPPER & COAL CO. **COLORADO & WYOMING.**

Office: Encampment, Wyo. Mine office: Pearl, Larimer Co., Colo. J. E. Hedding, president; J. W. Hedding, secretary. Lands include 2 copper claims, area 40 acres, near Pearl, Larimer Co., Colo.; 6 gold claims, known as El Rey gold mine, area 98 acres, and 3,595 acres of coal lands, circa 15 miles from Walden, Larimer Co., Colo. Latter tract is said to show a 65′ vein of coal, which could be developed by stripping. Coal lands are remote from transportation, but probably will be of value eventually. Idle for several years.

CONSOLIDATED GOLD & COPPER MINING CO. **UTAH.**

Office: 25 Broad St., New York. Letter returned unclaimed from former mine office, La Sal, Grand Co., Utah. A. Graham Donnelly, president; N. D. Harrison, secretary; Gid R. Propper, superintendent. Capitalization $20,000,000. Claims also to have lands in Utah, Montana, Colorado and Oregon, with a total of 56 claims. Is grossly overcapitalized, idle, and management, at last accounts, proposed reorganizing—presumably in order to sell more stock to people who like that sort of thing and are willing to pay real money for it.

CONSOLIDATED GOLD & COPPER MINING & MILLING CO. **WYOMING**

Dead. Formerly at Encampment, Carbon Co., Wyo. Described Vol. VI.

CONSOLIDATED GOLD MINES CO. **WASHINGTON.**

Letter returned unclaimed from former mine office, Berlin, King Co., Wash. H. H. Sherrod, superintendent. Lands, 2 claims, known as the Una group, formerly the John Stevens mine, opened 1892, on Miller river, 5 miles from Berlin. Mine has about 1,800 tons of ore, blocked out for stoping, giving assays copper, 3 oz. silver and $4 gold ton.

OLIDATED GREENE COPPER CO. **ARIZONA.**

Mine office: Kirtland, Yavapai Co., Ariz. Lands, near the Zonia Copper

Mining Co., circa 9 miles southeast of Kirtland, show ores giving average ass of 6 to 10% copper and 2 to 6 oz. silver per ton.

CONSOLIDATED GREEN MOUNTAIN ST. LOUIS MINES, LTD. BRITISH COLUMB

Office: care of Chas. D. Clark, treasurer, Peoria, Ills. Letter returned claimed from former mine office, Rossland, Trail district, B. C. W. L. Lo president. Capitalization $3,000,000, shares $1 par. Has a 400′ shaft. for some years and apparently moribund.

CONSOLIDATED GREENWATER COPPER MINING CO. CALIFORN

Office: 1306 Keystone Bank Bldg., Pittsburg, Pa. Mine office: Greenwa Inyo Co., Cal. John A. Kirby, president; J. G. Butler, Jr., vice-president; W ter C. Lamb, secretary; Eugene Howell, treasurer; preceding officers, H Francis Newlands, W. H. Blackburn and Arthur Kunze, directors. Organi 1906, under laws of South Dakota, with capitalization $1,500,000, shares par. Lands, 23 claims, area circa 450 acres, in 3 groups, showing 4 practica parallel copper veins, widest 25′. Idle.

CONSOLIDATED JEFFERSON GOLD & COPPER MINING CO. UTA

Office: 221 Atlas Block, Salt Lake City, Utah. Mine office: Brighton, S Lake Co., Utah. A. W. Neiman, president; H. F. Wallstein, vice-preside Frank Rumel, secretary and treasurer; preceding officers, Julius Coop, C. Nicholson, Nicholas Schmittroth, A. Y. Reed and Jacob Coop, directors; F. Shule, superintendent. Organized June, 1902, under laws of Nevada, w capitalization $1,000,000, shares $1 par.

Lands, 49 claims, 7 fractional, and 40 acres placer grounds for a build site, in the Big Cottonwood district, having a 1,400′ tunnel, with about a qu ter-mile of workings, showing sulphide ores, said to average circa 5% cop with small silver values and high gold values. Equipment includes a g machinery plant and necessary mine buildings.

CONSOLIDATED KANSAS CITY SMELTING & REFINING CO. TEX

Works office: El Paso, El Paso Co., Tex. Is controlled, through st ownership, by American Smelting & Refining Co., and is a branch of same.

CONSOLIDATED KING DEVELOPMENT & COLUMBIA COPPER MINING CO. ARIZO

Office and mine: Jerome, Yavapai Co., Ariz. Geo. W. Hull, preside H. E. Wilcox, secretary. Organized under laws of Arizona, with capitaliza $6,000,000, shares $1 par. Lands, 34 claims, area 400 acres, in the Verde trict, adjoining the United Verde on the south and east, showing several bodies carrying oxide, carbonate and sulphide ores, giving fair assay value copper, gold and silver. Development is by a 400′ shaft and several tunn longest 1,750′. It is claimed that about $250,000 has been expended on property. Idle for several years.

CONSOLIDATED LA SAL MINING & SMELTING CO. COLORA

Dead. Formerly at Cashin, Montrose Co., Colo. Fully described Vol. V

CONSOLIDATED MERCUR GOLD MINES CO. UTA

Office: P. O. Box C, Salt Lake City, Utah. Mine office: Mercur, Too Co., Utah. John Dern, president; Wm. M. Thompson, secretary; Geo. Dern, treasurer and general manager. Is a gold mine, but has tailings car ing thousands of tons of copper, which eventually may be recovered partia

CONSOLIDATED MINES & DEVELOPMENT CO. ARIZON

Mine office: Globe, Gila Co., Ariz. Organized 1905, with capitalizat $500,000, shares $1 par. Lands, 8 claims, at the head of Arkansas Gulch, miles west of Globe, from which diamond drill cores have shown 6% c apparently from stringers in the ledge. A 45′ shaft is claimed to be bottom in solid sulphide ore. Idle.

CONSOLIDATED MINING & SMELTING CO. **NEW MEXICO.**

Mine office: Cerillos, Santa Fé Co., N. M. R. B. Thomas, manager; J. L. Wells, superintendent. Ores carry gold, silver, lead, zinc and copper, latter in small quantities, as a by-product. Property includes the Tom Paine, Albany and other mines, extensively developed and well equipped with gasoline and electric power. Has a 120-ton lead smelter.

CONSOLIDATED MINING & SMELTING CO. **UTAH.**

Dead. Formerly at Brigham, Box Elder Co., Utah.

CONSOLIDATED MINING & SMELTING CO. OF CANADA, LTD. **BRITISH COLUMBIA.**

Office: 49 Wellington St., Toronto, Ont. Mine office: Rossland, Trail district, B. C. Works office: Trail, Trail district, B. C. W. D. Matthews, president; Geo. Summer, vice-president; W. H. Aldridge, managing director; preceding officers, E. B. Osler, Chas. R. Hosmer, H. S. Osler, W. L. Matthews, J. C. Hodgson and F. P. Buck, directors; R. H. Stewart, mine manager; Jules Labarthe, smelter manager; John N. Turnbull, engineer.

Organized 1905, as Canadian Consolidated Mines, Ltd., and name changed, Jan. 1, 1906, to present title, with capitalization $5,500,000, shares $1 par; issued, $5,355,200. First quarterly dividend of 2.5% was paid April, 1906, and dividends, 1907, were $500,005. Annual meeting, fourth Tuesday in September.

Company is mainly a securities holding corporation, controlling, through stock ownership, the Centre Star Consolidated Mining Co., War Eagle Consolidated Mining & Development Co., Ltd., St. Eugene Consolidated Mining Co., Ltd., and the Rossland Power Co., companies in question being described separately under their respective titles. Also holds, under lease, the Snowshoe mine, at Phoenix, B. C., and owns the Richmond-Eureka mines at Sandon, B. C., Phoenix-Amalgamated, Crown Point and Iron Mask mines, at Rossland, and owns and operates the Canadian Smelting Works at Trail.

The reduction works include both copper and lead departments, and in addition to treating ores from the mines of the company, it does an extensive custom business, mainly on Rossland ores. In connection with the smelter is an acid plant making sulphuric acid as a by-product.

The sampling plant, built 1906, includes a 100-ton Gates crusher, 3 Vezin automatic samplers and a Jones riffle sampler.

The copper smelter, of 1,650 tons daily capacity, has one 42x264" Bruckner furnace and five 42x240" Bruckner furnaces, taking a 32-oz. cold blast, with 24 Huntington-Heberlein pots. Ore and fluxes are handled in hopper-cars, drawn by three 10-h. p. electric locomotives. First fusion product is a matte of only 7 to 12% copper tenor, which is granulated and roasted in 2 O'Hara calciners, the 10 hand-roasters formerly used having been discarded. Calcined matte is briquetted, and resmelted to a matte of circa 50% average copper tenor. The roast department includes 6 Bruckner roasters. The second fusion matte is shipped to the Tacoma works, for conversion.

The lead smelter, of 350 tons daily capacity, has two 60x244" furnaces, and 6 Huntington-Heberlein calcining furnaces of 26' diameter. The lead plant includes an electrolytic lead refinery, handling silver-lead-zinc ores, which is the first ever built, and these works have turned out commercial lead assaying 99.997 fine, which means that 1 ton of lead carried only 1 oz. of impurities—a marvelously successful result. In connection with the lead refinery is an antimony plant, built 1907, which is designed to fill a promising field.

Power at the works is electric throughout, brought 30 miles, from Bonnington Falls, on the Kootenai river, a line current of 32,000 volts being stepped down to 550 volts at the smelter, where 1,000-h. p. is used by 16 motor units. Fuel at the smelter is coke.

t and general manager; Arthur L. Tuttle, general superintendent; mine superintendent; S. D. Bridge, auditor and sales agent. Or- ril, 1905, as successor of Continental Copper Co. Ownership and t are practically the same as that of Jimulco Mining Co. ty is extensive mines at Pánuco and Romero Rubio, including La roup at latter point. Principal property is the Mina Pánuco, an ened circa A. D. 1700, and worked at intervals since. Mine, bought nuco Copper Co., Ltd., which was a badly mismanaged corporation, 00' deep, having a fissure vein in syenite, carrying mainly slightly ous chalcopyrite, estimated by former owners as of 6% average cop- but actually averaging about 4%.
any owns a 71-kilometer railroad, from Monclova to Pánuco, with ives, costing circa $300,000, and has invested about $1,000,000, all gest production under former ownership, 1902, was 665 long tons fine roduction was begun circa July, 1907, by present owners, at rate of tons daily, shipped to Velardeña smelter, shipments being deflected, 1907, on closing down of Velardeña smelter, to the Aguascalientes hen production was cut to about 3,000 tons monthly. Mine considered and management good.

ENTAL MINING CO. **WYOMING.**
. Formerly at Encampment, Carbon Co., Wyo. Fully described Vol. VII.

ENTAL SMELTING & REFINING CO. **COLORADO.**
. Became bankrupt June 5, 1907. Was successor of Saratoga Smelt- efining Co. Formerly at Ironton, Ouray Co., Colo. Fully described

& MONTANA MINING CO. **MONTANA.**
e: Owsley Blk., Butte, Mont. Mine office: Cooke, Park Co., Mont. Kearns, president; Thos. Hicks, vice-president and manager; J. C. Fetig, ; Dr. Chas. M. Eddy, treasurer. Capitalization $250,000, shares $10 ands, 4 claims, on Henderson Mountain, in the New World district, ed by a tunnel of circa 600' length having a back of about 300', showing aying 13.6% copper, 34 oz. silver and $14 gold per ton. Has a power mithy and cabins, and a second tunnel is planned. Property considered ng, though handicapped by lack of adequate transportation facilities.

EY HILL GOLD & COPPER MINING & MILLING CO. **WYOMING.**
d. Lands passed, 1907, to Emerald Mining Co. Formerly at Wheat- le Co., Wyo.

COPPER & GOLD MINING CO. **OREGON.**
Mine office: North Powder, Union Co., Ore. Mine, indications of copper at bottom. Has gaso-

WASHINGTON.

WYOMING.
Co., Wyo.

IRELAND.
on, E. C., Eng. Mine office: Schull, Tancred, Bart., chairman; Thos. Will- 10, 1906, under laws of Great Britain, with ssued, £20,000, fully paid. Prop- , at yearly rental of £30 and 30% ne, area 329 acres. Property, for- favorably by J. Andrew Wauchope. irman, is a guinea-pig, with a long

The company employs a total force of circa 1,400 men, at the va sidiary mines and works, about 350 being at the smelter.

Operations, 1907, were hampered by two coal miners' strikes, sever and a serious fall in the market price of both copper and lead, notwit which a very creditable record was made. For the fiscal year endin 1907, production was 3,433,310 lbs. copper, 20,380,083 lbs. lead, 1,100, ver and 69,186 oz. gold. Receipts for fiscal year 1907, were $4,06 smelter products, and $812,263 from ores sold. For fiscal year endin 1908, the works treated 305,956 tons of ore, producing 4,004,468 lbs per, 32,157,139 lbs. lead, 2,224,888 oz. silver and 121,380 oz. gold. pany controls valuable mines, and has a thoroughly modern and wel smelter that gives exceptionally successful results, with a stron perienced management.

CONSOLIDATED MOUNT LYELL COPPER MINES, LTD. TA

Dead. Formerly at Gormanston, Montagu Co., Tasmania.

CONSOLIDATED NICKEL, TIN & COPPER MINES, LTD.

Office: 6 Court Row, Guernsey, Eng. Ernest H. Williams man; J. Simon, secretary. Organized March 21, 1903, under Guernsey, with capitalization £60,000; issued £53,480, partly full p part paid. Was organized to adopt an agreement with the Leri Mines, Ltd. Apparently moribund.

CONSOLIDATED STANLEY MINING & MILLING CO. CO

Dead. Succeeded by Stanley Mines Co. Formerly at Idaho Spr Creek Co., Colo.

CONSOLIDATED UNITED VERDE JUNIOR MINING CORPORATION. ARIZONA & CO

Office. Old Orchard, Me. Letter returned unclaimed from forme fice, Jerome, Yavapai Co., Ariz. Daniel L. Dean, president; F. A. secretary and treasurer. Capitalization $2,000,000, shares $1 par. the Lucile group in the Wisconsin district of Gilpin Co., Colo. Ari were lost. In debt and apparently moribund.

CONSOLIDATED VERDE MINING & MILLING CO. NEW

Dead. Organized Aug. 23, 1899, and reorganized Oct. 24, 1904, a Mountain Mining Co. Formerly at Cimarron, Colfax Co., N. M.

CONSTANTINE COPPER MINING CO. W

Dead. Formerly at Encampment, Carbon Co., Wyo. Described

CONSOLIDATED WHITE BEAR MINING CO., LTD. BRITISH CO

Mine office: Rossland, Trail district, B. C. J. J. Warren, supe Ore is auriferous and argentiferous chalcopyrite, carrying values silver and gold, friable and sliming badly in concentration. Equ cludes a 150-h. p. Jenckes electric hoist and a 30-drill Rand com compressor, driven by a 300-h. p. electric motor. Has a mill with stamps, having double-discharge mortars, 6 Wilfley tables and a 4-u oil concentrator. Production, 1907, was 310 tons of concentrates tons of ore, carrying circa 100,000 lbs. fine copper. Formerly empl 25 men. Closed down October, 1907.

CONSTELLATION CONSOLIDATED COPPER MINES. CAL

Mine office: Campo Seco, Calaveras Co., Cal. Idle.

CONSTELLATION GOLD MINES CO.

Dead. Formerly at Sumpter, Baker Co., Ore.

CONSTITUTION CONSOLIDATED COPPER MINES. NEW

Office: care of Boody, McLellan & Co., 57 Broadway, New Y Mine office: Lucero, Mora Co., N. M. Jas. R. Pitcher, president; Woodward, vice-president and secretary; F. M. Andrus, treasurer; officers, Hon. Frémont Cole and A. H. Hall, directors; S. W. Tyler,

engineer. Organized Apr. 24, 1906, under laws of Maine, with capitalization $3,000,000, shares $1 par. Lands, 400 acres, showing 3 parallel beds of slate or arenaceous shale, having an approximately north and south strike, with 3 minor ledges, main beds being 3′ to 8′ in thickness, carrying impregnations of malachite, chalcocite and bornite, occasionally weighing pounds, but occurring more commonly in masses of a few grains up to several ounces in weight. Veins extend nearly vertically, interbedded with limestone and arcose sandstone, the cupriferous shales containing both calcium carbonate and organic matter in appreciable quantities, probably accounting for precipitation of the copper ores. Apparently igneous rocks are lacking on the property, though these should exist if impregnations are to prove sufficiently rich to constitute ore of commercial grade. Ore is said to assay 3 to 20% copper, with net claimed average of at least 5% copper and $1 to $2 gold per ton, this estimate probably being too high. Development is by numerous pits and trenches, and by shafts of 230′ and 325′. Management is composed of men of excellent business and professional standing, but lacking mining experience. New Mexico has thousands of square miles of Permian red beds, carrying small percentages of copper, mainly of unworkable tenor. Future of the company is merely a question of the average copper contents of the shale beds, plus capital and management.

CONTACT COPPER CO. **MONTANA.**

Letter returned from former mine office, Helena, Lewis & Clark Co., Mont. W. H. Graeniling, superintendent. Organized 1906, with capitalization $40,000. Lands, in Colorado Gulch, circa 4 miles west of Helena, show a vein of 6′ to 7′ width, carrying slightly auriferous ore, giving average assays of 4 to 6% copper, from a 60′ shaft, showing ore from surface, which it is planned to sink to depth of 500′. Has gasoline power. Made, 1907, several small ore shipments.

CONTENTION MINING CO. **COLORADO.**

Mine office: Silverton, San Juan Co., Colo. Ores carry gold, silver and copper values. Has steam and water power. Presumably idle

CONTINENTAL CONSOLIDATED MINING CO.

Office: care of Ben Blanchard, manager, Mayer, Ariz. Mine office: Salome, Yuma Co., Ariz.

CONTINENTAL COPPER CO. **SOUTH DAKOTA.**

Dead. Succeeded by Continental Copper Mining & Smelting Co. Formerly at Hill City, Pennington Co., S. D.

CONTINENTAL COPPER CO. **MEXICO.**

Dead. Reorganized, April, 1905, as Continental Mining Co. Formerly at Monclova, Monclova, Coahuila, Mex. Fully described Vol. VI.

CONTINENTAL COPPER CO. **WYOMING.**

Dead. Formerly at Battle, Carbon Co., Wyo.

CONTINENTAL COPPER & GOLD MINING CO. **ARIZONA.**

Office: care of J. F. Halsted, secretary, County Recorder's office, Los Angeles, Cal. Mine office: Planet, Yuma Co., Ariz. Lands, 15 claims, on Bill Williams Fork river, in the northern part of Yuma county, on which a little development work has been done.

CONTINENTAL COPPER MINING CO. **WYOMING.**

Mine office: Battle, Carbon Co., Wyo. J. T. Brown, superintendent. Property in the Cow Creek district, is said to show a large outcrop of quartz impregnated with copper sulphides. A crosscut tunnel, planned to cut the vein at depth, was started.

CONTINENTAL COPPER MINING & SMELTING CO. **SOUTH DAKOTA.**

Office: Lima, Ohio. Mine office: Hill City, Pennington Co., S. D. A. C. Foster, president and general manager; J. W. Horton, vice-president; W. J.

Booth, secretary; H. M. Moore, treasurer; preceding officers, Thos. Swee C. J. Buell, A. K. Gardner and C. H. Kinter, directors; A. C. Overpeck perintendent. Organized March, 1907, under laws of South Dakota, with talization $3,000,000, shares $1 par, as successor of Continental Copper Bonds, $600,000 authorized, at 5%; issued, circa $150,000, in denominatio $100, $200 and $500, "convertible into stock after company has been pl on a paying basis." Is a holding company, its only property consisting of thirds of the stock issue of the Dakota-Calumet Co., and property is descr under title of latter.

CONTINENTAL COPPER SYNDICATE, LTD. AUST

Dead. Liquidated Apr. 20, 1906. Floated the Mitterberg Copper Ltd. Formerly at Innsbruck, Tyrol, Austria. Described Vol. VI.

CONTINENTAL GOLD MINING CO. OREG

Mine office: Nugget, Douglas Co., Ore. W. B. Stewart, president and eral manager, at last accounts. Ore is an auriferous iron-copper sulphide, values principally in gold. Was said, 1906, to be building a 50-ton con trator.

CONTINENTAL MINES & SMELTING CORPORATION. UT

Office: 505-52 Broadway, New York, N. Y. Operating office: 409 D Bldg., Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. Wm Robinson, president; Henry M. Crowther, vice-president and managing rector; G. C. Van Alstyne, secretary and treasurer; Richard S. Smith, su intendent; Harry Lee, mine superintendent. Organized July, 1903, under l of New York, with capitalization $1,500,000, shares $10 par. Is control through stock ownership, by Unity Mines Co. Empire State Trust Co., N York, registrar.

Lands, 30 claims, partly patented, area 460 acres, and a 20-acre mill Property shows circa 20 contact deposits, between limestone and porphyry, 1' to 40' width, giving assays of 2 to 35% copper, 10 to 48% lead, circa 7 zinc, 15 to 120 oz. silver and 60 cents to $5 gold per ton, from oxidized c per ores, galena and sphalerite. Lands formerly were held by the Lavi Grizzly Consolidated, Darlington and Regular mining companies, said to h produced upwards of $1,000,000 worth of ore. Mines were first opened c 1864.

Mines have 5 shafts, deepest 200', and 9 tunnels, of 300' to 2,000' leng with total workings of circa 18,000', estimated by company to show 742,000 t of ore, with 242,000 tons blocked out for stoping, which estimate is conside excessive.

Transportation is by a 5-mile Riblet aerial tram, greatly reducing the f mer freight cost of $1.75 per ton on outgoing ore, and $5 per ton on incom fuel and supplies.

A 100-ton mill, built 1905, puts about 4 into 1, turning out concentra said to carry circa 40% lead and 16 oz. silver per ton. Water from Little C tonwood Creek actuates a direct-connected Pelton wheel.

Company paid, to end of 1905, eleven 2% dividends on issued treas stock, amounting to $24,000, which apparently came from stock sales, and from earnings, hence is regarded unfavorably.

CONTINENTAL MINING CO. IDA

Office: Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. ganized May, 1908, under laws of Idaho, with capitalization $1,250,000, sha $1 par, by John P. Gray, Jas. T. McCarthy, M. J. Flohr, A. H. Comer Therres Towles. Lands are one claim.

CONTINENTAL MINING CO. MEXI

Office: care of City Brewery, San Antonio, Tex. Mine office: Mineral Pánuco, Monclova, Coahuila, Mex. Otto Koehler, president; Otto Wahrmu

vice-president and general manager; Arthur L. Tuttle, general superintendent; A. H. Buck, mine superintendent; S. D. Bridge, auditor and sales agent. Organized April, 1905, as successor of Continental Copper Co. Ownership and management are practically the same as that of Jimulco Mining Co.

Property is extensive mines at Pánuco and Romero Rubio, including La Reforma group at latter point. Principal property is the Mina Pánuco, an antigua, opened circa A. D. 1700, and worked at intervals since. Mine, bought of the Pánuco Copper Co., Ltd., which was a badly mismanaged corporation, is circa 600′ deep, having a fissure vein in syenite, carrying mainly slightly argentiferous chalcopyrite, estimated by former owners as of 6% average copper tenor, but actually averaging about 4%.

Company owns a 71-kilometer railroad, from Monclova to Pánuco, with 3 locomotives, costing circa $300,000, and has invested about $1,000,000, all told. Largest production under former ownership, 1902, was 665 long tons fine copper. Production was begun circa July, 1907, by present owners, at rate of about 200 tons daily, shipped to Velardeña smelter, shipments being deflected, October, 1907, on closing down of Velardeña smelter, to the Aguascalientes smelter, when production was cut to about 3,000 tons monthly. Mine considered valuable and management good.

CONTINENTAL MINING CO. **WYOMING.**

Dead. Formerly at Encampment, Carbon Co., Wyo. Fully described Vol. VII.

CONTINENTAL SMELTING & REFINING CO. **COLORADO.**

Dead. Became bankrupt June 5, 1907. Was successor of Saratoga Smelting & Refining Co. Formerly at Ironton, Ouray Co., Colo. Fully described Vol. VI.

COOKE & MONTANA MINING CO. **MONTANA.**

Office: Owsley Blk., Butte, Mont. Mine office: Cooke, Park Co., Mont. W. M. Kearns, president; Thos. Hicks, vice-president and manager; J. C. Fetig, secretary; Dr. Chas. M. Eddy, treasurer. Capitalization $250,000, shares $10 par. Lands, 4 claims, on Henderson Mountain, in the New World district, developed by a tunnel of circa 600′ length having a back of about 300′, showing ore assaying 13.6% copper, 34 oz. silver and $14 gold per ton. Has a power plant, smithy and cabins, and a second tunnel is planned. Property considered promising, though handicapped by lack of adequate transportation facilities.

COONEY HILL GOLD & COPPER MINING & MILLING CO. **WYOMING.**

Dead. Lands passed, 1907, to Emerald Mining Co. Formerly at Wheatland, Laramie Co., Wyo.

CO-OPERATIVE COPPER & GOLD MINING CO. **OREGON.**

Office: Rockford, Ills. Mine office: North Powder, Union Co., Ore. Mine, opened 1905, has a 180′ shaft, with indications of copper at bottom. Has gasoline power and electric light.

CO-OPERATIVE MINING CO. **WASHINGTON.**

Dead. Formerly at Berlin, King Co., Wash.

CO-OPERATIVE MINING & MILLING CO. **WYOMING.**

Dead. Formerly at Encampment, Carbon Co., Wyo.

COOSHEEN MINERALS, LTD. **IRELAND.**

Office: 5 Great Winchester St., London, E. C., Eng. Mine office: Schull, County Cork, Ireland. Sir Thos. Selby Tancred, Bart., chairman; Thos. Williams, Jr., secretary. Organized May 10, 1906, under laws of Great Britain, with capitalization £25,000, shares 5s. par; issued, £20,000, fully paid. Property is a 60-year lease, from March, 1906, at yearly rental of £30 and 30% royalty of net profits, of the Coosheen mine, area 329 acres. Property, formerly a copper producer, was reported upon favorably by J. Andrew Wauchope. Sir Thos. Selby Tancred, baronet, the chairman, is a guinea-pig, with a long

record of connection with various stock companies that have proven the reve of successful.

COPAQUIRE COPPER SULPHATE CO., LTD. CHI

Office: Bassishaw House, Basinghall St., London; E. C., Eng. Operat office: Casilla 266, Iquique, Chile. Mine office: Huatacondo, Copaquire, Ta pacá, Chile. H. P. Desham, chairman; H. Crewdson Howard, secretary; Rich Stanton, general manager; J. E. Gillmore, clerk. Organized May 19, 1900, un laws of Great Britain, and capitalization increased from £300,000 to £494,0 shares £1 par; issued, £309,082. Debentures, £20,000, first mortgage, at convertible at option of holders into shares at par, and £3,580 second-mortg debentures, at 6%, similarly convertible. Has issued no financial statem since July 31, 1903.

Lands, 25 claims, area probably 25 hectares, in 2 groups. The Huiquin group of 13 claims at Huatacondo, carries dioptase and chrysocolla, t silicates of copper occurring as the cementing material in a conglomerate up to 85′ thick. Company estimates 6,000,000 long tons of 3.25% ore exp

The Copaquire group, which was the original property, has granite country rock, showing an abundance of oxidized copper minerals, mainly co sulphates and sub-sulphates averaging 2.5 to 3% in copper tenor. The man ment of the company always has stated that the deposits were natural b stone, with some impurities mechanically mixed therewith, but, as a ma of fact, the ore deposits consist of a mixture of three different salts, very cult of separation. Company's "experts" have estimated that the Copa deposits show upwards of 100,000,000 long tons of ore, worth £20,000 Development is by a 150′ shaft and about 1,000′ of open-cuts and trenches.

Equipment includes a 45-h. p. steam plant, warehouse, office and labora of stone, to withstand numerous and severe earthquake shocks. The lixiviz plant, covering about 1 acre, is rated at 500 tons daily capacity, with a hydrator for drying crystals of bluestone. Mine and leachery are conne by a 4,000′ tramline. Nearest railway is 70 miles distant, transport bet being on the backs of mules, over rough mountain roads. Soft coal costs £8 per ton, delivered, and this price being prohibitive, yareta is burned, ma for fuel. This is a gigantic club-moss, having a lob of resin, a single cl occasionally weighing more than a ton.

The company ended 1905 about £30,000 in debt, but a proposed reorga tion was voted down by shareholders. Reconstruction or bankruptcy s inevitable. The property is not devoid of promise, but requires ample f and technical ability in its management, if success is to be secured.

COPETE CONSOLIDATED COPPER CO. MEX

Office: 1104-27 William St., New York, N. Y. Mine office: Pesqueira, Sonora, Mex. Col. Britton Davis, vice-president and managing director; B. Martin, secretary and treasurer; preceding officers, Hollister Logan Prof. Geo. A. Treadwell, directors. Organized 1906, under laws of West ginia, with capitalization $1,000,000, shares $1 par.

Company was organized to finance the Copete Mining Co., under cont and was to have one-half the net earnings therefrom, being practically underwriting corporation for the Copete Mining Co. Company holds e stock issue of Melczer Mining Co., which corporation holds direct title to mines of the Copete Mining Co., this stock having been turned over by Copete Mining Co., the former owner. The Copete Consolidated Copper failed to comply with the consideration named in the transfer, which ap ently was fraudulent, and suit has been instituted to set the matter ri Officers of the company are said to be creditors to the extent of $20,000, being an old dodge of the Logan-Martin gang. Further particulars regard the company will be found in description of the Copete Mining Co.

COPETE & MELCZER MINING CO. **MEXICO.**

Dead. Succeeded (its only success), circa 1900, by Copete Mining Co. Formerly at Pesqueira, Ures, Sonora, Mex.

COPETE MINING CO **MEXICO.**

Office: 1104-27 William St., New York, N. Y. Mine office: Pesqueira, Ures, Sonora, Mex. Myra B Martin, secretary; Chas. S. Spraker, general manager. Organized 1900, under laws of West Virginia, with capitalization $5,000,000, shares $5 par. Company apparently has invested about $1,000,000, but it is impossible to state how much of this has been diverted from legitimate channels of expenditure.

The Copete Mining Co. formerly owned the entire stock issue of the Melczer Mining Co., which holds direct title to the Copete lands, but this stock was turned over, Apr. 10, 1906, to the Copete Consolidated Mining Co., which promised sufficient money to put the property on a dividend basis, but failed to furnish same. Suit has been instituted in connection with this transfer, which apparently was fraudulent, Hugh M. Creighton, Lock Box 1388, New York, being in charge of the investigation for a shareholders committee. Under the transfer arrangement the Copete Mining Co. was to pay back to the Copete Consolidated money loaned, with interest at 6%, and any proceeds, through sale of stock of the Melczer Mining Co., was to be divided equally between the Copete Mining Co. and the Copete Consolidated Copper Co. The agreement between the two companies was signed by Myra B. Martin, a notorious petticoat grafter, as secretary for Copete Consolidated Copper Co., and by the late "General" Walter S. Logan, an equally notorious grafter of the other sex, now dead, for the Copete Mining Co. Apparently the Copete Mining Co. has been stripped of everything by the action of its officers, its only assets having been the stock of the Melczer Mining Co. The property is described under title of Melczer Mining Co.

The Copete Mining Co is a deliberate swindle, which has taken large sums from deluded shareholders, and its promoters, except Logan, who is dead, should be punished for their frauds.

COPIAPÓ MINING CO., LTD. **CHILE.**

Office: 138 Leadenhall St., London, E. C., Eng. Mine office: Copiapó, Atacama, Chile. Nicol Brown, chairman; preceding officer, Albert Straube, H. Loeffler, J. A. D. Hancke and Henry von Berg, directors; W. Hoeltzer, general manager; W. S. Bartlett, secretary. Organized June 21, 1836, under laws of Great Britain, and capitalization increased March, 1899, to £250,000, and later to £300,000, shares £2 par; issued, £225,000. Debentures, £50,000 authorized, February, 1907, in denominations of £100, convertible into shares at par. Last dividend, 1903, was 1s. 6d.

Lands include groups of mines in the valley of the Rio Copiapó, and at Paypote, also a half interest in the Republicana mine and a large hacienda near Copiapó. The company owns 1,200 meters of the strike of 6 veins, having development for circa 500 meters horizontally, with average development of approximately 400 meters depth. The Copiapó was one of the first British mining companies to operate in Chile.

The Dulcinea mine, at Púquios, on which work is now centered, was opened 1851, and has been, for some years, the largest copper producer of Chile. The mine is very deep, the Fletcher or main shaft being 960 meters deep on the incline, or 870 meters vertically, being the deepest in South America. The Weir shaft was 1,800' deep in 1906. Greatest extent of longitudinal workings is 1,100'. The Dulcinea has 2 parallel veins traceable 8 to 10 kilometers, with strike of N. 30° E. and dip of 65°, separated by 8 to 10 meters of decomposed diabase porphyry. Veins average about 5' in width, with occasional enlarge-

ments up to 20′ and even 25′, and one vein, in the bottom workings, is
to be circa 8′ wide and to average 11% copper. The oxidized zone, of ab
220 meters depth, carries ores averaging circa 3.8 oz. silver with fair g
values, and occasional cerussite and wulfenite. The sulphide zone carries ma
chalcopyrite and cupriferous pyrite, with very small gold and silver values, in
ing a gangue of quartz and occasional calcite. The mine makes very li
water, but lower workings are very hot, and there was a serious mine
1905, from spontaneous combustion. Ore reserves, to the 450-fathom level,
mainly depleted, and of rather indifferent grade, with a better showing be
the 480-fathom level, the south drift on this floor showing a 3′ vein of l
ore, average tenor of ore extracted, 1905, having been 14.8% copper.

The Descubridora mine, in the Checo district, opened 1825, was
company's original property, but produced, 1905, only 658 long tons of ore
compared with 10,160 metric tons in 1903, and is now idle.

The Ojancos group, at Ojancos, Atacama, includes the Carmen Alto,
Francisco and Antonio mines. As a whole, this group has proven disappoint
and is now idle, though the Carmen Alto and San Francisco produced 30
metric tons of ore of good average grade in 1903. The Carmen Alto has a
main shaft. The San Francisco has a 350′ main shaft, and ore produced, 1
averaged 16% in copper tenor. The Antonio is as yet in the develop
stage. The Republicana was showing poorly, when closed down, and
been idle some years.

There is a 5,808-meter aerial tram from La Dulcinea to Llanos de V
whence ore is taken by cart to the works.

The concentrator, at Puquios, has 4 crushers, 2 Wilfley tables and o
washing machinery, but has not given satisfactory work, losses in tailings b
unduly large. There are extensive old dumps of low grade ore, estimate
60,000 metric tons averaging 4.61% copper, and this ore is being treate
the new mill.

The works include an extensive lixiviation plant, near the mill, w
oxidized ores of low average tenor are treated.

In 1903 the Dulcinea mine produced 14,850 metric tons of ore, averag
15.54% copper, which was about 7% of the total production of Chile,
was the largest output made by any mine in the Republic. Production
the company was 3,131,520 lbs. fine copper in 1904, but, owing to dam
from fire, was only 2,515,520 lbs. in 1905, and is estimated at 3,500,000 lbs.
1907.

COPPER AGE & EDISON MINING CO. MONTA

Mine office: Saltese, Missoula Co., Mont. C. J. Heidenrich, president
general manager. Organized 1906, under laws of Washington, with capita
tion $250,000. Lands, 12 claims, 4 miles south of Saltese, lying just eas
the Monitor and Richmond mines and carrying extension of the ledge of la
Mine, opened December, 1906, has a 700′ tunnel cutting a 6′ vein of chalcopy
giving assays up to 29.1% copper, with fair gold values.

COPPER AGE MINING & SMELTING CO. WYOMI

Dead. Formerly at Rambler, Carbon Co., Wyo. Described Vol. VII.

COPPER APEX MINING CO. UT

Office: Salt Lake City, Utah. L. B. Wright, president; D. G. Scott, v
president; A. A. Pike, secretary; Sherman Fargo, treasurer. Organized, 1
to develop a group of claims in the Scott Hill district, between the Big Cot
wood and Uintah districts, in Summit county, Utah. Development is b
shallow shaft, showing argentiferous copper ore of good grade.

COPPER BAR MINING CO. NEW MEXI

Dead. Formerly at Organ, Donna Ana Co., N. M. Fully described Vol.

COPPER BAR MINING CO. **WYOMING.**

Office 206 Burr Blk., Lincoln, Neb. Mine office: Saratoga, Carbon Co., Wyo. W. J. Crane, president; H. M. Stratton, vice-president; Geo. E. Hibner, secretary and general manager; Fred Williams, treasurer; preceding officers, H. Schoettger, Fred Echenkamp and Ernst Hoppe, directors; J. B. Hassett, mine manager.

Lands include the original holdings, now idle, on Cow Creek, near Rudefeha, and the Charter Oak group of 14 claims, 5 patented, bought 1908, on California Creek, circa 16 miles southwest of Saratoga.

The Charter Oak mine, having a 488' main shaft, has circa 2,200' of workings. Development under former owners was misdirected, the shaft having been sunk at right angles to the vein. The Charter Oak has a shallow zone of oxidation, succeeded by sulphides in a schistose gangue, latter claimed to average 12% copper, several ounces silver and $6 gold per ton, with upward of 300,000 tons of ore blocked out, but these figures, made by the former owners, are greatly exaggerated. Has steam power and shipped a little ore, 1907. Property considered promising.

COPPER BASIN GOLD & COPPER MINING CO. **ARIZONA.**

Dead. Formerly at Prescott, Yavapai Co., Ariz. Described Vol. V.

COPPER BASIN MINING CO. **ARIZONA.**

Mine office: Mayer, Yavapai Co., Ariz. Organized 1907, under laws of Arizona, with capitalization $1,250,000, by J. H. Brodrick, William Little and W. A. Hurst. Lands, 17 claims, adjoining the Commercial Mining Co., having a 140' shaft, showing auriferous and argentiferous copper ore.

COPPER BASIN MINING CO. **ARIZONA.**

Mine office: Yuma, Yuma Co., Ariz. Presumably idle.

COPPER BASIN MINING CO. **COLORADO.**

Office: care of B. B. Harlan, president, Chicago, Ills. Mine office: Placerville, San Miguel Co., Colo. Milton Evans, superintendent, at last accounts. Lands, 15 claims, opened by shaft. A carload of ore shipped to smelter returned 14% copper and $2.50 gold per ton. Idle for several years.

COPPER BASIN MINING & SMELTING CO. **NEVADA.**

Office: 45 Wells St., New York, N. Y. Eleanor Rawls-Reader, president and treasurer; Carroll D. Galvin, managing director; J. Mitchell Galvin, fiscal agent; Earle H. Matthis, superintendent. Chas. F. DeArmond, manager. Organized 1907, under laws of Maine, with capitalization $6,000,000, shares $1 par. Is controlled, through stock ownership, by Cerro de Pasco Tunnel & Mining Co. Lands were 20 claims, on Bald Mountain, in the southern end of the Ruby range, White Pine county, Nevada. Company claimed that these mines resembled both the Butte mines and the United Verde, which seems rather remarkable. Did a little development work, by shaft and 4 tunnels, and planned—in advertisements—a smelter, promising $600,000 net earnings yearly when smelter was built, but fell behind with pay-roll and lost lands. Moribund.

COPPER BELLE MINING CO. **ARIZONA.**

Office: 43 Wooster St., New York, N. Y. Mine office: Gleeson, Cochise Co., Ariz. Peter Quinn, president; Elie J. Moneuse, vice-president; preceding officers, Henry G. Mayer, Frank H. Hereford and Geo. E. Crawford, directors. Organized 1904, with capitalization $1,000,000, as a reconstruction of a company of the same name, which became bankrupt, circa 1903, under suspicious circumstances.

The mine was developed by John Gleeson, with fairly satisfactory results, but the eastern management foolishly superseded Gleeson, and begun a policy of lavish expenditures that ruined the first company, and a continuation of which ruined the present company. Gleeson retired, taking a mortgage on the property for his interest, and considerable sums in cash were borrowed of

Martin Costello. Property was leased, 1906, to the Shannon Copper Co., u a $1,500,000 bond. Judgment was rendered, June, 1907, for $272,299.6 favor of Paine, Webber & Co., of Boston, for money advanced, secured note. Minority shareholders intervened, alleging fraud in that the note lac consideration, and a 30-day stay was granted. Property was sold, July, 1 to satisfy a mortgage held by Martin Costello, and was bid in, by Nathan Amster, president of the Shannon Copper Co., presumably for that corporati Company is hopelessly bankrupt, having reaped as it sowed.

COPPER BELLE MINE. ARIZON

Mine office: Gleeson, Cochise Co., Ariz. Nathan L. Amster, gene manager; Geo. K. Reed, superintendent. Mine, formerly owned by Copp Belle Mining Co., was bought, at sheriff's sale, July 25, 1908, for circa $90,0 by Nathan L. Amster, presumably representing the Shannon Copper Co., wh took the mine, September, 1906, under a $1,500,000 bond and lease.

Lands, 8 claims, in the Turquoise district, having a 2-compartment 2 shaft, showing ore claimed by former owners to average 7% copper, which an overestimate, with fair gold and silver values.

The smelter, of 50 tons daily capacity, is a mistake, and of no value wh ever. This formerly produced a 30% matte.

Mine employs circa 35 men, and, first half of 1908, shipped circa 2 carloa of ore daily. Production, 1907, was 64,982 lbs. fine copper, 20,843 oz. silver a 307 oz. gold. Property considered promising, and now in strong hands.

COPPER BELL MINING CO. UTA

Mine office: Brigham, Box Elder Co., Utah. F. M. Bishop, president; W. Duffield, vice-president; Alonzo Young, treasurer; Wm. Crabbe, secreta Organized 1907, under laws of Utah, with capitalization $50,000, shares cents par. Presumably idle.

COPPER BELLE MINING CO. WASHINGTO

Dead. Lands sold, 1901, to Bunker Hill-Sullivan Mining Co. Formerly Index, Snohomish Co., Wash.

COPPER BELL MILL & MINING CO. MONTA

Dead. Lands sold by sheriff Jan. 10, 1905, afterward going to Calum Montana Mining Co. Formerly at Clinton, Missoula Co., Mont., and Red R Beaverhead Co., Mont.

COPPER BELL MINING & MILLING CO. UT

Office: care of John P. Anderson, president, Springville, Utah. Mine o Ibapah, Tooele Co., Utah. Robert Hutchinson, vice-president; T. R. K secretary and treasurer; preceding officers, Jas. Oakley and C. D. Palfrey directors. Organized 1906, with capitalization $50,000, shares, 25c par. L in the Dugway district, are opened by a 112′ shaft showing lead and c ores said to assay up to $100 per ton in value.

COPPER BELT MINES CO. WYOM

Office: 407-135 Adams St., Chicago, Ills. Mine office: Lusk, Converse Wyo. Edwin Hall, president; E. S. Averill, vice-president; Arthur A. T secretary and treasurer; preceding officers, B. L. Paine and Peter Ni directors. Organized June 25, 1906, under laws of Wyoming, with capit tion $2,000,000, shares $1 par; issued, $1,400,456. Property is held subje an unpaid balance of $50,000, due the Copper Belt Mining & Milling C Oct. 25, 1910, without interest. Company owns a controlling interest i Lucky Strike Mining & Smelting Co.

Lands, 35 claims, area circa 600 acres, of which about 100 acres are bered, with running water on the property, in the Rawhide Buttes distric miles south of Lusk, the nearest railroad point. Property shows 4 pa veins, 2 traceable nearly a mile, developed by a 620′ main shaft and a tunnel intersecting on the 400′ level, with circa 1,400′ of workings at

re also being 250′ tunnel and several shallow shafts with circa 2,400′ gs, all told, showing ore assaying 3 to 60% copper, with small silver d $1.40 to $12 gold per ton, company estimating its ore to average copper, mainly from carbonates to depth of nearly 600′, followed by in limonite.

ment includes a 54-h. p. Fairbanks & Morse gasoline engine, a 1,500′ a 5-drill Franklin air-compressor, with machine-shop, smithy, engine- several other small mine buildings.

dvertising done by this company, at the time of its flotation, was aggerated and highly censurable. These advertisements claimed that stake gold mine, in the adjoining state of South Dakota, is appar- he same ledge, which is one of the most remarkable geological dis- f the century. Advertisements also stated that history does not ingle instance of a copper mine pinching out, which would be import- e. Company's advertisements claim that the mine has enough ore going for centuries, which undoubtedly is correct, if progress is no l in the future than formerly. Company figures, in advertisements, product of 500 tons daily, a $100 investment should yield $1,500 might be added that on an output of 500,000 tons daily the annual rom a $100 investment should be $1,500,000. When estimating pos- ts it always is well to take the highest possible figures, as these are sy to make, and are more pleasing to the "investors" who buy ed stock certificates, on the basis of such estimates.

BELT MINING CO. **UTAH.**

Formerly at Marysvale, Piute Co., Utah. Fully described Vol. VII.

BELT MINING & MILLING CO. **WYOMING.**

: Grain Exchange, Omaha, Neb. Mine office: Lusk, Converse Co., w. M. Weston, president; Wm. B. Parsons, vice-president; A. H. Mer- retary and treasurer; Edwin Hall, manager. Property was sold to lt Mines Co., and apparently only asset is a balance on purchase price , due Oct. 25, 1910, from the Copper Belt Mines Co.

BLUSH MINING CO. **COLORADO.**

office: Jamestown, Boulder Co., Colo. S. C. Bashor, president. Lands, ellow Hill, show milling ores said to carry stringers of high-grade lluride.

BOND COPPER CO. **NEVADA.**

office: Ely, White Pine Co., Nev. Organized 1907, under laws of with capitalization $1,500,000. Lands, west of the Veteran mine, are ve been prospected with a 6" churn drill, which is said to have struck ing 18% copper and $2 to $20 gold per ton.

BOTTOM MINING & REDUCTION CO.

r returned from former office, Pueblo, Colo. Organized 1906, under Colorado, with capitalization $2,000,000, by Thos. M. Bowen, R. F. H. P. Baxter, M. P. Bowen and Henry C. Royce. Location of lands, nknown.

BOY CONSOLIDATED MINING & MILLING CO., WASHINGTON.

e office: Valley, Stevens Co., Wash. Lands, 20 claims, showing ore up to 4.5% copper and $5 to $20 gold per ton, with gross average f about $10 per ton. Is said to plan a 50-ton mill.

BULLION MINING CO. **ARIZONA.**

l. Formerly at Pearce, Cochise Co., Ariz. Fully described Vol. VI.

BULLION MINING CO. **UTAH.**

e: care of J. N. Christensen, president, Provo, Utah. Robt. Anderson, ; P. P. Hindmarsh, treasurer. Organized 1907, with capitalization

$1,000,000, shares 5 cents par. Lands, 13 claims, in the Santaquin distric of Utah.

COPPER BULL MINING CO. **COLORADO**

Offices: 211 North 7th St., St. Louis, Mo., and Lock Box 507, Pueblo, Colo Mine office: Walsenburg, Huerfano Co., Colo. Chas. R. Mason, president Isaac M. Mason, secretary and treasurer; Chas. O. Unfug, general manager H. S. McIntyre, superintendent. Organized 1901, under laws of Arizona, wit capitalization $3,000,000, shares $1 par. Lands, 32 claims, patented, area 52 acres, on Copper Bull Mountain, showing five 7′ fissure veins, carrying oxid ores, with claimed values of 10% copper, 2 oz. silver and $80 gold per ton which is much too high. Has shafts of 202′ and 238′, and tunnels of circa 300 and 700′. Has 4 mine buildings and has been said to be erecting an 80-to smelter. Advertising was deceptive and company is not regarded favorably Idle and presumably moribund.

COPPER BUTTE MILLING CO. **IDAHO**

Office: Ninde Bldg., Ft. Wayne, Ind. Mine office: Weiser, Washington Co. Idaho. O. P. Eversole, secretary; J. Harvey Allen, superintendent. Was offer ing, February, 1908, an issue of $600,000 ten-year 6% bonds, with 100% stock bonus, subject to redemption at 106, after 3 years. Lands, apparently 1 clai only, with millsite and water right, including the Peacock mine, formerly hel by Peacock Copper Co., held under 10-year lease, circa 3 miles from the Snak river and about 50 miles northwest of Weiser, the nearest railroad point, con nected therewith by a fair wagon road. Mine, discovered 1869, with abou 1,500′ of openings, is said to have about 100,000 tons of ore of all grades i sight, and shipped, by wagon, under former ownership, a little ore of 40 to 70% copper tenor. It is claimed to have shipped about 15,000 tons of high-gra ore, and to have, on the dumps, upwards of 100,000 tons of ore averaging 6% copper, with small gold and silver values. Ten shipments, 1903, to Bingha smelter, returned 13.3 to 18.3% copper, from 3 to 5 oz. silver and from nothi to $1.33 gold per ton, and 11 shipments to Oregon Smelting & Refining Co. gav returns of 20.5 to 40.2% copper, 1.15 to 8.7 silver and $1.20 to $3.40 gold pe ton. A 50-mile narrow-gauge railroad, from Council to the Peacock mine, ha been planned by other interests. Company's prospectus states that this pro erty includes the purchase of a 200-ton smelter near the Weiser river, on a tra of circa 550 acres, with townsite and available water power. The Peacock is high-grade mine of much promise, but is handicapped by lack of adequa transportation facilities.

COPPER BUTTE MINES. **ARIZON**

Office: 523 Lyceum Bldg., Duluth, Minn. Mine office: Phoenix, Maric Co., Ariz. Capt. Harry Roberts, president and general manager; Geo. H. Abe vice-president; Benj. C. Shelden, secretary; Henry W. Knoche, treasur Organized July 21, 1900, under laws of Arizona, as the Arizona Copper Mou tain Mining Co., name being changed, June, 1904, to present title, with ca talization $6,000,000, shares $10 par.

Lands, 34 claims, unpatented, and a 5-acre millsite, on the Gila river, the Walnut Grove district of Pinal county, Arizona, with a good wagon r 1½ miles from mine to the Phoenix & Eastern railway. Property shows gran and limestone, intruded by an immense cupriferous breccia, of 1,300′ to 3,0 width, traceable circa 7,000′, carrying oxidized ores for some little depth, w sulphides shown in lowest workings. Average of 39 assays was 7.39% c and circa $2 gold per ton, but actual extraction would be very much lowe

Property was worked, 1879-1881, for silver. Present development about twenty 15′ pits, 6 shafts of 30′ to 60′ depth, and shafts of 175′ and also by 6 tunnels, longest 275′ and 300′, with circa 2,000′ of workings, mated by management to show 5,000,000 tons of ore.

pment includes a 60-h. p. steam plant, with 2 hoists, a 20x30′ machine- 2 bunk-houses.

uction, for year ending July, 1907, was circa 650 tons of ore, of 7.5% opper tenor, equal to about 100,000 lbs. fine copper. Suspended work 1907, on account of the low price of copper. Property considered and management good.

BUTTE MINING CO. **SOUTH DAKOTA.**

office: Custer, Custer Co., South Dakota. Idle.

BUTTE MINING CO. **WASHINGTON.**

office: Orient, Ferry Co., Wash. J. D. Gumpper, president; H. J. ecretary; Willis Townsend, general manager. Organized December, er laws of Washington, with capitalization $1,000,000, shares $1 par. claims, patented, in the Pierre Lake district south of Orient, opened and shafts of 10′ to 75′ depth, with about 700′ of workings, showing w-grade ore, with some ore giving good assays.

BUTTES CONSOLIDATED MINING & LTING CO. **CALIFORNIA.**

Formerly at Bagdad, San Bernardino Co., Cal. Fully described

CAÑON MINING CO. **NEW MEXICO.**

office: Abiquiu, Rio Arriba Co., N. M. J. E. Irvine, superin- Lands, 100 acres, undeveloped. Idle several years.

CANYON MINE. **BRITISH COLUMBIA.**

office: Mt. Sicker, Vancouver Island, B. C. Lands, sundry claims foot of Mt. Sicker, in the Nanaimo district, opened by 2 tunnels, 4′ vein of good ore. Idle several years.

CANYON MINING CO. **ARIZONA.**

office: Mayer, Yavapai Co., Arizona. S. T. Allen, president; L. T. e-president; E. A. Girvin, secretary; C. A. Westenberg, treasurer; officers, J. F. Littlefield, C. H. Haight and Wilbur Treadwell, direct- ganized under laws of Arizona, circa 1905, with capitalization 00, shares $1 par. Lands, 5 claims and a millsite, in the Black Canyon formerly held by the Black Canyon Copper Co., Ltd., which went out ss without paying its debts. Claims considered promising, but capi- is excessive, and company is not regarded with favor. Idle and y moribund.

CAVE MINING CO. **WYOMING.**

office: Saratoga, Carbon Co., Wyo. J. F. Crawford, manager. Idle ears and apparently moribund.

CENTER MINING CO. **IDAHO.**

e: Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho.

CENTURY MINE. **ARIZONA.**

office: Washington, Santa Cruz Co., Ariz. Geo. A. Lonsberry, super- t. Ores are argentiferous copper, lead and zinc sulphides. Has gaso- er. Idle.

CHIEF MINING CO. **ARIZONA.**

e office: Jerome, Yavapai Co., Ariz. Arthur Hendy, superintendent. ear the Equator, circa 5 miles south of Jerome, show a large body of us and argentiferous copper ore, and mine is claimed to have upwards 0,000 worth of ore blocked out, which is a serious overestimate. Ore is nd difficult of reduction. Property is developing slowly, but is con- of some promise.

CHIEF MINING CO. **MONTANA.**

e office: Borax, Saltese Co., Mont. J. H. Nordquist, president; Otto , secretary and treasurer. Lands, 11 claims, in the St. Joe district,

supposed to carry the extension of the Bullion vein, which company plans t open by a crosscut tunnel, at circa 700′ depth.

COPPER CHIEF MINING CO. NEW MEXIC

Dead. Succeeded, 1903, by Sater Copper Co. Formerly at Clayton, Uni Co., N. M. Described Vol. III.

COPPER CHIEF MINING CO. WASHINGTO

Office: Everett, Wash. Mine office: Index, Snohomish Co., Wash. Lan 4 claims, between Galena and Mineral City, in the Silver Creek camp, having 600′ tunnel showing an 8′ vein with a 2′ paystreak. Idle.

COPPER CHIEF MINING CO., LTD. MONTAN

Office: 604 The Rookery, Spokane, Wash. Letter returned unclaimed fro former mine office, Dillon, Beaverhead Co., Mont. H. A. Fosselman, presiden J. S. Graves, vice-president; F. M. Longshore, secretary and general manage F. M. Dudley, treasurer. Organized June, 1901, under laws of Washingto with capitalization $375,000, shares 25 cents par. Lands, 7 claims, area 1 acres, in the Silver Star district of Madison county, Montana. Country roc are granite and limestone, showing 5 contact veins, with some work on ea mine having 9 pits and shafts of 10′ to 112′ depth. Main vein, estimated b company to average 10′ width, shows carbonates at surface, with chalcocite an chalcopyrite at a little depth, giving average assays of 10% copper, 2 to 5 o silver and $1.60 to $31 gold per ton. Has a 40-h. p. hoist, good for 1,000′, an necessary mine buildings. Idle.

COPPER CITY MINE. ALASK

Office: Coppermount, Prince of Wales Island, Alaska. Lands, sundry clai on the beach, at Cordova Bay, 6 miles south of Coppermount. Has fair min buildings, and shipped some good ore to the Crofton smelter, circa 1905. Pr sumably idle.

COPPER CLIFF MINES OF MONTANA, LTD. MONTAN

Office: 8 Broad Street Avenue, London, E. C., Eng. Mine office: Elliston Powell Co., Mont. S. E. Illingsworth, chairman; R. S. Illingsworth, min manager; A. Hebden, secretary. Organized Sept. 11, 1903, under laws Great Britain, with capitalization £200,000, shares £1 par, in £65,000 "A preference shares and £135,000 common shares, preference shares taking profits up to par value of stock, after which preferred becomes common stoc Issued, £30,282. Lands, 140 acres, bought of the Copper Cliff Mining Co., ha ing an 186′ shaft and tunnels of 300′, 500′ and 800′, showing contact veins fair width, carrying oxide, carbonate and sulphide ores, which are claimed give average assay values of 10% copper and $10 gold per ton. Claims o reserves of 72,140 long tons.

COPPER CLIFF MINING CO. ARIZON

Dead. Lands sold, 1902, to Catalina Copper Mining Co., also dead. Fo merly at Tucson, Pima Co., Ariz.

COPPER CLIFF MINING CO. BRITISH COLUMBI

Office: Seattle, Wash. Mine office: Heriot Bay, Nanaimo district, B. Wm Simison, president and general manager; C. W. Carter, secretary. Orga ized 1906, presumably under laws of Washington, and registered under la of British Columbia as an extra-provincial company, with capitalization $10,0 shares $1 par. Property, on Heriot Bay, Valdes Island, has a strong ledg with a paystreak of about 10′ of chalcopyrite, of smelting grade, with conside able development. Shipped 120 tons of ore, 1906, to the Tyee smelter.

COPPER CLIFF MINING CO MONTAN

Dead. Succeeded, Sept. 11, 1903, by Copper Cliff Mines of Montana, Lt Formerly at Elliston, Powell Co., Mont.

COPPER CLIFF MINING CO. SOUTH DAKOT

Dead. Formerly at Rochford, Pennington Co., S. D. Described Vol. VI.

R CLIFF SYNDICATE, LTD.
ce: 14 Queen Victoria St., London, E. C., Eng. Organized Oct. 17, 1906, ıws of Great Britain, with capitalization £5,000, in 4,900 ordinary shares ır, and 2,000 deferred shares of 1s. par, to acquire copper mines in the States. Location of lands, if any, unknown.

R COBRE MINING CO. **ARIZONA.**
ıd. Succeeded by Bradshaw Mountain Copper Mining & Smelting Co., ıd. Formerly at Middelton, Yavapai Co., Ariz.

R COMPANY OF ARIZONA. **ARIZONA.**
ıd. Was organized circa 1907, under laws of Arizona, with capitaliza- 000,000, shares $5 par, as reconstruction of the Arizona Amalgamated Company, and was reorganized, circa 1907, as the Coppermines Company ona. Formerly at Clifton, Graham Co., Ariz.

R COMPANY OF BRITISH COLUMBIA, LTD. **BRITISH COLUMBIA.**
ce: 11 Grocers' Hall Ct., London, E. C., Eng. Formerly in the Kootenay of British Columbia. Moribund.

R CONCENTRATING CO. **MICHIGAN.**
ıd. Succeeded August, 1907, by Mason Manufacturing Co., entire stock h is owned by Houghton Concentrating Co. Formerly at Houghton, ın Co., Mich. Very fully described Vol. VII.

R CORPORATION OF CHILI, LTD. **CHILE.**
ıd. Voluntarily liquidated, December, 1906. Lands sold to Las Animas Mining & Smelting Co., Ltd. Formerly at Las Animas, Chañaral, a, Chile. Described Vol. III.

R CREEK CONSOLIDATED COPPER CO. **ARIZONA.**
ıd. Lands were sundry claims between the Brooklyn and Rosalie, circa east of Mayer, in the Black Hills range. Formerly at Big Bug, Yava- Ariz.

R CREEK CONSOLS, LTD. **BRITISH COLUMBIA.**
ıd. Formerly at Ashcroft, Yale district, B. C.

R CREEK DEVELOPMENT CO. **ARIZONA.**
ıe office: Hillside, Yavapai Co., Ariz. Lands, 35 miles northeast of Hill- ened by tunnel, are said to show ore of good average tenor, with copper increasing at depth.

R CREEK MINING CO. **ARIZONA.**
ce: 407 Metropolitan Bldg., Minneapolis, Minn. Operating office, Ariz. Mine office: Copper Creek, Graham Co., Ariz. Frank J. Sibley, ıt and general manager; Chas. H. Robinson, vice-president; John E. secretary; R. Roy Sibley, treasurer and superintendent; preceding M. W. Atwood and D. C. Reynolds, directors; W. H. Salisbury, mine ; C. N. Carter, mill superintendent; C. S. Gelser, engineer; F. Fay master mechanic. Organized June 18, 1903, under laws of Arizona, ıpitalization $2,000,000, shares $1 par; issued, $1,725,000. On Aug. 1, ısh on hand was $9,500, with $30,500 cash due the company. Paid, 04, to July, 1905, inclusive, 5 quarterly dividends of 1½% on preferred ımounting to $1,735.69, but preferred stock apparently since retired, isely, as no mining company has any business to pay dividends except ırnings.

nds, 80 claims, area 1,500 acres, also 300 acres in mill and smelter sites, east of Mammoth, in the Bunker Hill district of the Galurio Moun- Country rock is diorite, with immense porphyritic intrusions, showing a ımber of ore bodies, occurring as fissure veins in rhyolite and as con- posits between rhyolite and porphyritic rocks, 3 ore bodies being under ment. Property is in 3 groups, the upper group, of circa 800 acres, near r of the Galurio Mountains, showing rhyolite and basalt, with fissure

veins carrying cuprite, melaconite, malachite, chalcocite and chrysocolla. Th Middle Basin group, area circa 500 acres, shows 3 strong hematite gossa carrying copper, along a granite-porphyry and limestone contact. The lowe camp, 2 miles from Middle Basin, shows mainly diorite, ore being principall chalcopyrite, with small quantities of chalcocite and cuprite. The Sioux Chie group shows an outcrop traceable one-half mile, vein carrying chalcocite sul to have given mill returns on test of 40% copper and 50 oz. silver per to Property includes a water-right, 16 miles from the mines, estimated to b capable of developing 500 h. p. at low stage of water.

The mines have shafts as follows: Sioux Chief, 220'; Iroquois, 232'; Amer ican Eagle, 300'. There are tunnels as follows: the Pettit, 718'; Ute Chie 300', and on the American Eagle group, the Upper, Middle, Lower and No. tunnels, with combined length of 800'. The mines have circa 7,000' of work ings, with 55 different openings, estimated to put 500,000 tons of ore in sigh with 150,000 tons blocked out for stoping.

Equipment includes a 240-h. p. steam plant, 200-h. p. electric plant and 60-h. p. gasoline plant, with 1 gasoline and 3 electric hoists, largest of latte of 82 h. p., good for 1,000' depth, having a hoisting capacity of 5,000 lbs. 600' per minute. Machinery includes a 3-drill Rand air-compressor.

There are about 50 buildings including an engine house, boiler-hous smithy, machine-shop, warehouse, a 52x60' stone store, and dwellings for em ployes.

A 200-ton concentrator, of wood, with galvanized iron roof, has one 9x1 Blake crusher, three 16x36" rolls, 3 Wilfley tables, 10 Card tables, Callo screens and a 6-compartment 4' Richards pulsator classifier.

Nearest railway is the Phoenix & Eastern, at Winkelman, 30 miles distan but survey was made, 1908, for a railroad to the mine, planned to be bui shortly. An aerial tram is being built across the Gila river, latter makin trouble at times of high water, and the company plans a 2-mile electric surfa line from the mine to the smelter site.

Forces average 90 men, and work is being pushed systematically. Com pany plans deepening the American Eagle 2-compartment shaft to 700' an doing extensive drifting and crosscutting, also adding to the central electri power plant, and building a smelter of at least 150 tons daily capacity, doubling size of mill to 300 tons, though probably the smelter will be built f preference.

Production, 1905, was 49,000 lbs. fine copper, but no production wa secured 1906 or 1907, though a little ore was shipped, on test, to Denver, i 1908. Company estimates 1909 production as probably 5,000,000 lbs. fin copper, from ore averaging 4 to 5.5% in tenor. Estimated costs are $2 p ton for mining, 50 cents for concentrating and $3.90 for smelting. Propert has been developing for several years, and large ore bodies have been opene Mine considered valuable and management good.

COPPER CREEK MINING CO. CALIFORNI

Dead. Formerly at Kaweah, Tulare Co., Cal.

COPPER CREST MINING CO. CALIFORNI

Letter returned unclaimed from former office, Los Angeles, Cal. Min office: Redding, Shasta Co., Cal. Organized 1905, to operate the Milton min and to develop the Copper Crest group. Idle.

COPPER CROWN OF ARIZONA MINING CO. ARIZON

Dead. Lost lands Jan. 1, 1905, through failure to do annual assessmen work. Formerly at Pearce, Cochise Co., Ariz. Described Vol. V.

COPPER CROWN MINING CO. IDAH

Letter returned unclaimed from former mine office, Mullan, Shoshone C Idaho. F. Albert Massing, president. Organized Dec. 11, 1907, under laws

Arizona, with capitalization $125,000, shares 10 cents par, as a reconstruction of the Iron Crown Mining & Milling Co. Lands, east of Mullan, have an 800' tunnel with a 600' back, said to show a vein of high grade ore, with 2 small veins carrying medium grade copper ore.

COPPER CROWN MINING CO. OF MICHIGAN. **MICHIGAN.**

Office: 1013 Easton Ave., St. Louis, Mo. Mine office: Matchwood, Ontonagon Co., Mich. Dr. M. J. Hopkins, president; J. E. Allen, vice-president and treasurer; W. R. Hopkins, secretary; Baxter L. Brown, general manager; preceding officers, F. O. Cutler and F. L. Huntoon, directors; Enoch Henderson, superintendent. Organized July 18, 1902, under laws of Michigan, with capitalization $2,500,000, shares $25 par. Annual meeting, second Tuesday in July.

Lands, 3,740 acres, 6 to 8 miles west of the Victoria and 8 miles north of Matchwood, the nearest railroad point, including a number of old mines on which more or less work was done, 1850-1860, principal properties being the Hamilton, Norwich and Lafayette. First work of present company was on the Hamilton, where a 602' tunnel was driven and a 270' shaft sunk on the Meads vein, the tunnel of 602' securing a back of only circa 300', and a shaft was sunk mistakenly on a drift boulder in sandstone. Later work has been on the Norwich, which, next to the Victoria, is the most extensively developed and promising mine west of the Ontonagon river. The Norwich tunnel is 950' long, with circa 1,000' of drifts that give an encouraging copper showing. The Norwich mine, worked 1850-1865, produced 496 tons 1,360 lbs. fine copper, including masses of native metal up to 10 tons in weight. The lode is bunchy, but shows considerable promising stamp-rock. The Meads lode was located by a series of prehistoric pits along the outcrop, the 270' shaft thereon showing a strong bed, up to 25' in width, with a 720' drift to the westward on the fourth level.

Equipment includes a power-house, pumphouse, toolhouse, smithy, barn and dwellings, with 250-h. p. and 120-h. p. engines, 40-kw. dynamo, 250-h. p. boiler and 4-drill and 5-drill air-compressors.

The company began life as a wildcat, doing some remarkably misleading advertising, and the early mining work was very badly planned. Later the company gave satisfactory evidences of genuine reform, and for several years past its work has been along legitimate lines, especially since Mr. Henderson took charge of the property, when the mining practice was vastly improved, and sinking was done that should have been begun years earlier. Operations were suspended, January, 1908, through lack of funds, and 28 labor liens, aggregating nearly $4,000, were filed. Property is considered promising, but the company has no particular prospects of success unless thoroughly reorganized and given adequate working capital, as copper mining operations in the Lake Superior district are the most expensive in the world, with the possible exception of gold mining on the Witwatersrand of South Africa.

COPPER CROWN OF NOVA SCOTIA MINING CO. **NOVA SCOTIA.**

Dead. Formerly at Pictou, Pictou Co., N. S. Described Vol. VI.

COPPER CZAR MINING CO. **ARIZONA.**

Mine office: Mayer, Yavapai Co., Ariz. Loyal A. Osborne, manager; E. F. McClave, superintendent. Has gasoline power.

COPPER EAGLE MINING CO. **OREGON.**

Mine office: Merlin, Josephine Co., Ore. R. J. Ginn, president; N. P. Ginn, secretary; J. C. Mattison, superintendent. Lands, in the Galice district, show a 10' quartz vein giving assays of 10 to 30% copper, opened by a tunnel of circa 300'.

COPPER EAGLE MINING & SMELTING CO. **MONTANA.**

Office and mine: Butte, Silver Bow Co., Mont. A. W. Burnett, president; Frank Mullins, vice-president; A. Dome, secretary and treasurer. Organized

1907, with capitalization $500,000, shares 50 cents par, as a reconstructio the Eagle Mining & Smelting Co. Property is the Eagle claim, north Walkerville, and about a quarter mile north of the Alice mine, having a shaft, with about 300′ of drifting on the 200′ and 250′ levels, ore carr mainly silver, with small copper values, commercial copper ore being expe at depth of circa 600′. Shipped, 1907, a little ore ranging up to 90 oz. si and $6.50 gold per ton. Has a steam hoist and smithy. Resumed w August, 1908.

COPPER ESTATES OF WESTERN AUSTRALIA, LTD. AUSTRAL

Office: 66 Finsbury Pavement, London, E. C., Eng. Mine office: No ampton, Western Australia. Jas. Barrie, chairman; John McLaren, secret Organized March 4, 1903, under laws of Great Britain, as reconstruction company of some title, which, in turn, succeeded the Derby Syndicate, L with capitalization £15,000, shares 5s. par. Lands, 1,050 acres, freehold. since circa 1904.

COPPER EXPLORERS, LTD. AUSTRAL

Office: Winchester House, London, E. C., Eng. Mine office: Cobar, Rob son Co., N. S. W., Australia. A. E. Barton, chairman; E. Jacobs, secret Organized Jan. 1, 1900, with capitalization £40,000, shares £1 par, to acq the North Cobar mine, in New South Wales. Idle for several years.

COPPER FACE MINING & POWER CO. IDA

Office: care W. H. Hoefenger, Spokane, Wash. Letter returned unclai from former mine office, Mullan, Shoshone Co., Idaho. Organized 1907, w capitalization $1,500,000. Lands, 14 claims, between Saltese and Mullan, sh ing 3 veins. Has a short tunnel, planned to cut the main vein at a dista of circa 1,700′.

COPPER FALLS MINING CO. MICHIG

Dead. Absorbed, 1898, by Arnold Mining Co. Formerly at Copper Fa Keweenaw Co., Mich. Fully described Vol. I.

COPPERFIELD MINE. ARIZO

Mine office: Salome, Yuma Co., Ariz. Lands, 103 claims, in the Gre stone camp.

COPPERFIELD MINES. VERMO

Office: 820 Pennsylvania Ave., Pittsburg, Pa. Mine office: Vershi Orange Co., Vt. Geo. Westinghouse, owner. Property includes the old and Copperfield mines, having a strong ore body carrying low-grade disse nated chalcopyrite. Has a 3,700′ main shaft, sunk at 23°, equal to circa 1,5 vertical depth, and a 1,000′ tunnel, leading from the 300′ level to mill. Red tion plant includes a combined mill and smelter, connected with the mine b gravity tram. Smelter has 2 water-jacket blast-furnaces, one reverberat furnace and one converter stand. Property was worked on a considera scale, previous to circa 1860, and was reopened, 1900, by present owner, w spent large sums thereon, but met with disappointment. Best ore has b stoped, ore growing markedly leaner with depth. Mine has perhaps 20 tons of low-grade ore in sight. Idle since circa 1903.

COPPERFIELD MINING CO. COLORA

Office: Colorado Springs, Colo. Mine office: Copperfield, Frémont Colo. Lands, 9 miles from Cotopaxi, in the western part of Frémont cou adjoin the Copper Prince and the Colorado Mining & Smelting Co. Comp said to plan sinking a 750′ shaft. Presumably idle.

COPPERFIELD MINING CO. UT

Dead. Formerly at Bingham Canyon, Salt Lake Co., Utah.

COPPER FIELDS OF NAMAQUALAND, LTD. CAPE COLO

Office: Dashwood House, London, E. C., Eng. J. Eustace, chairman; A. Eustace, secretary. Organized Sept. 3, 1897, under laws of Great Brit

talization £100,000, shares £1 par; issued, £88,432. Lands, 354 acres, in maqualand, Cape Colony, South Africa, known as the Buffalo River lle.

FLAT MINING CO. **NEVADA.**
l. Expired circa 1904. Formerly at Ely, White Pine Co., Nev.

FLOAT MINING & MILLING CO. **WYOMING.**
e: care of P. N. Hodgins, Denver, Colo. Mine office: Tie Siding, o., Wyo. Organized, September, 1906, under laws of Wyoming, with ation $1,000,000. Lands are on Sherman Hill.

GIANT GOLD & COPPER MINING CO. **WYOMING.**
l. Lands sold, 1908, by sheriff, to satisfy a judgment for $1,642.71. at Encampment, Carbon Co., Wyo.

GIANT MINING CO. **ARIZONA.**
e: care of O. Z. Kane, general manager, Tucson, Ariz. Mine office: ell, Pima Co., Ariz. Lands, 50 claims, in several different groups, lying the Imperial mine and to the eastward of the Silver Hill Mountains, by about 500′ of shafts and tunnels, with a 100′ shaft on the Copper laim. Property shows a contact vein, with bold outcrops, between e and quartzite. Ore is chalcopyrite, with occasional chalcocite, and m the Copper Giant shaft are claimed to average 15% copper, 20 to lver and $4 to $7 gold per ton, which estimate is excessive. Is said to option to the Calumet & Arizona Mining Co.

GIANT MINING CO. **UTAH.**
e office: Promontory, Box Elder Co., Utah. W. E. Headings, president; ager, vice-president; G. A. Livingston, secretary; J. H. Kidd, treasurer; g officers, S. S. Buckwalter and Ernest D. Sadler, directors. Organized nuary, 1907.

GIANT MINING CO. **WASHINGTON.**
l. Formerly had an office in Spokane, Wash.

GLANCE CONSOLIDATED MINING CO. **UTAH.**
l. Reorganized January, 1907, as Bingham Copper Glance Mining Co. at Bingham Canyon, Salt Lake Co., Utah.

GLANCE MINING CO. **ARIZONA.**
e and mine: Bisbee, Cochise Co., Ariz. S. W. Clawson, president and ; A. S. Barker, secretary; C. L. Beckwith, general manager. Organized 1901, under laws of Arizona, with capitalization $2,500,000, shares $1 nds, 24 patented claims, area 480 acres, in the Warren district, about outheast of Bisbee. Has shafts of 50′, 100′, 140′ and 560′, and tunnels l 150′. Idle since circa 1904. Very fully described Vol. IV.

GLANCE MINING CO. **NEW MEXICO.**
l. Formerly at Taos, Taos Co., N. M.

GLANCE MINING & MILLING CO. **COLORADO & WYOMING.**
l. Lost Colorado lands through inability to pay for them, and lost g lands through failure to do annual assessment work. Formerly at Montrose Co., Colo., and Encampment, Carbon Co., Wyo. Fully de- Vol. VI.

GLOBE MINING CO. **UTAH.**
l. Lost lands November, 1902. Formerly in Emery county, Utah.

GOLD MINING CO. **WASHINGTON.**
l. Formerly at Bossburg, Stevens Co., Wash.

GOLD MINING & MILLING CO. **WYOMING.**
l. Formerly at Heela, Laramie Co., Wyo.

GORGE DEVELOPING CO. **NEW MEXICO.**
e: 82 Wisconsin St., Milwaukee, Wis. Mine office: Santa Rita, Grant M. Lands, 12 claims. Company was asserted, in the press, to have got

Prickett, president; G. D. Russell, vice-president; E. L. Tate, secretary, treasurer and manager; preceding officers, T. E. McBroom, E. L. Dyer and H. Jones, directors. Organized under laws of Washington. Lands, 7 claims, fractional, on Belcher Mountain, adjoining the Oversight group on the north, having a 145′ shaft and 3 tunnels, longest 571′, showing low-grade auriferous chalcopyrite, of 1 to 3% copper tenor, associated with pyrite, marcasite, hematite and magnetite. Has a 7-drill air-compressor. Property, though low in grade, is considered promising.

COPPER KING OF ARIZONA. ARIZONA.

Dead. Lands sold under foreclosure, Aug. 28, 1905, to former shareholders and reorganized under title of Arizona Copper Syndicate of Providence. Formerly at Pearce, Cochise Co., Ariz. Fully described Vol. V.

COPPER KING OF ARIZONA MINING CO. ARIZONA.

Dead. Reorganized, 1903, under title Copper King of Arizona, also dead. Formerly at Bisbee, Cochise Co., Ariz. Fully described Vol. IV.

COPPER KING GOLD & COPPER MINING CO. NEVADA.

Mine office: Mizpah, Elko Co., Nev. Made a few shipments of auriferous and argentiferous copper ore, claimed to average about $100 per ton in value, during latter half of 1907.

COPPER KING, LTD. CALIFORNIA.

Mine office: Letcher, Fresno Co., Cal. Geo. W. Ade, receiver; C. E. Leavitt, superintendent. Company, organized under laws of Great Britain, was said to have been liquidated, 1903, but the estate remains in process of adjustment, and considerable dividends have been paid to creditors, from operations under the receiver. Was expected, 1908, that receiver would be discharged shortly, and company take possession.

Lands, 90 acres, circa 20 miles from Fresno, having a 250′ working shaft with 6 levels opened, having about one-half mile of drifts. Property has a schistose vein, of circa 100′ width, carrying a 2′ to 20′ paystreak, with oxidized ores above and sulphides below, of about 7% average copper tenor.

The reduction plant included a concentrator and smelter, at Martinez, known as the Bay Point smelter, which was sold in 1907. Ore produced later was sent to the Tacoma smelter.

The old management squandered about £250,000, ending with a net indebtedness of £100,000, but, under the able management of Mr. Ade, this debt was liquidated, and company put in good shape financially. Employed circa 5[illegible] men before suspending operations, October, 1907

COPPER KING MINE. ARIZONA.

Office and mine: care of Peter Johnson, owner, Bisbee, Cochise Co., Ariz. This is the property first held by the Copper King of Arizona, abandoned circa 1902, and relocated, 1903, by present owner. Has a 625′ shaft, in porphyry, which has cut a number of small stringers of copper ore. Property, which lies between the Denn-Arizona and Cochise Development tracts, was generally regarded as worthless, until circa 1904, when developments on the Junction lands of the Superior & Pittsburg indicated the possibility of considerable ore bodies underlying the conglomerate over the porphyry and limestone contact. Material on dump, taken from shaft, is altered and slightly mineralized porphyry, carrying considerable iron pyrites. Idle since circa 1902.

COPPER KING MINE. BRITISH COLUMBIA.

Letter returned unclaimed from former mine office, Nelson, Kootenay district, B. C. Lands, 6 claims, near the Queen Victoria property, at Beasley, [illegible] miles west of Nelson, showing several exposures of sulphide ore. Has a grave overburden, carrying considerable float ore. Idle since circa 1902.

COPPER KING MINE. BRITISH COLUMBIA.

Mine office: Kamloops, Yale district, B. C. Lands, sundry claims, 16 mile[illegible]

Kamloops, showing ore giving assays of 5 to 20% copper, 1 to 6 oz. l $10 to $20 gold per ton. Shipped 500 tons to the Crofton smelter, l. Idle since circa 1905.

KING MINE. **CALIFORNIA.**

: care of Wm. Purdue, Spokane, Wash. Mine office: Hutton, Siskiyou Has a vein of about 75′ width opened by a 659′ tunnel giving a back 350′, showing auriferous copper ores, ores and nature of their occur- ngly resembling the Blue Ledge property, in the same district. Is n press, to have $25,000,000 worth of ore in sight, which, of course, is ggeration.

KING MINE. **COLORADO.**

office: Twin Lakes, Lake Co., Colo. Jas. Harrison, manager. Lands, on Middle Mountain, circa 13 miles from Twin Lakes, showing, in granite and porphyry dykes, a 20′ fissure vein, with a 12″ hanging- reak carrying medium grade auriferous and argentiferous copper ore, veloped by tunnel.

KING MINE. **IDAHO.**

office: Landore, Washington Co., Idaho. Is said to have a 15′ vein 3′ paystreak of bornite. Idle.

KING MINE. **MONTANA.**

office: Parrot, Madison Co., Mont. Lands, 1 claim, 2 miles southeast showing ores assaying up to 12.5% copper, 0.85 oz. silver and $2.80 n. Idle for several years.

KING MINE. **OREGON.**

office: Comer, Grant Co., Ore. Property, slightly prospected, is a little-known district. Idle.

KING MINE. **PHILIPPINES.**

office: Benguet, Luzon, Philippines. Hanson & Meade, owners. Lands, ed river, show refractory ores carrying fair copper and gold values. amp mill was planned, at last accounts, to treat ores for their gold

KING MINE. **TASMANIA.**

l by Burnie Copper Mines.

KING MINE. **YUKON.**

office: Whitehorse, Yukon, Canada. Lands include the Copper King, ot, Anaconda, Spring Creek and miscellaneous claims, in the Wheaton ear Whitehorse. Is said to be owned by Pittsburg capital. Mine l shallow shafts and open-cuts, and a crosscut tunnel, in limestone, e 150′ from the portal. Property shows high-grade ore, in small at numerous points. Has a hoist and air-compressor. To end of shipped, to British Columbia smelters, circa 400 tons of ore, averag- 15% copper and $1 to $2 combined gold and silver values per ton. o ore, 1907, but stocked several thousand tons. Employs circa 30 perty considered promising, but requires further development.

KING MINING CO. **ARIZONA.**

office: Tucson, Pima Co., Ariz. Lands are in the Tucson Mountains. al years and apparently moribund.

KING MINING CO. **COLORADO.**

Formerly at Boulder, Boulder Co., Colo.

KING MINING CO. **COLORADO.**

Succeeded, circa, 1904, by Pearl Copper Mining & Smelting Co. t Pearl, Larimer Co., Colo.

KING MINING CO. **IDAHO.**

and mine: Shoup, Lemhi Co., Idaho. Earl Gilbreath, manager. Is a rtnership, not an incorporation. Lands, 11 claims, area 220 acres,

[illegible] Institute will [illegible] are [illegible] cupel [illegible] to 30 [illegible] per ton

[illegible] MONTAN

[illegible] OREGO

[illegible] UTA

[illegible] Salt Lake C

[illegible] WASHINGTO

[illegible] WYOMI

[illegible] IDAH

[illegible] Idaho. P. [illegible] secretar [illegible] superi [illegible] capitalizati [illegible] acre m [illegible] buildings [illegible] Devils distri [illegible] by 7 p [illegible] showing argenti [illegible] pyrite, giving assays

[illegible] MINING & MILLING CO. WASHINGTO

[illegible] Organized January, 19

[illegible] MINING & MILLING CO. WASHINGTO

[illegible] Pass, Wash.

[illegible] MINING MILLING & DEVELOPMENT CO. MONTAN

[illegible] J. Nelson, president; R. M. Mande [illegible] treasurer. Organized Decem [illegible] capitalization $150,000, shares 15 cen [illegible] ing, in the Goose Lake basin, deve [illegible] ing ore of low to medium grade.

[illegible]ER KING MINING & SMELTING CO. IDAH

[illegible] Co., Idaho. E. B. Crawford, president H. W. [illegible] and general manager; Wm. Commerilh, treasure [illegible]. Organized Aug. 28, 1905, under laws of Idah [illegible]capitalization $1,500,000, shares $1 par. Is raising money for a ne l, by [illegible] assessments at 6-month intervals.

[illegible]ands, 13 claims, 2 fractional, in the Hunter and Leland districts, ne [illegible]nowstorm mine, showing a 5' to 6' contact vein, between quartzite an [illegible]lone, with a paystreak of 6" to 2' carrying massive galena assaying cir [illegible]opper, 28% lead and 18 oz. silver per ton, and a vein of 10' to 40' widt [illegible]en quartzite and limestone, carrying a 4' paystreak of argentiferous co [illegible]re, with some native silver. Has about 3,000' of workings, mainly tunne [illegible]e Copper Queen vein, on the Burke side of the range, and, July, 19

arted a new tunnel on the west fork of Deadman Gulch, planned to be driven 600', at depth of 927' below the old tunnel, to be completed circa January, 1910.

Equipment includes a 30x60' engine-house, 30x60' boarding-house, and a drill air-compressor. Property considered promising.

COPPER KING MINING SYNDICATE. **WASHINGTON.**

Office: Tacoma, Wash. R. E. McFarlane, president; C. L. Judd, vice-president; E. Areith, secretary and treasurer; D. E. Guiley, superintendent. Capitalization, $10,000,000. Lands, 64 claims in Pierce county, Washington, including the old Eastlick mine, opened by a 130' crosscut tunnel, with a small amount of drifting, which produced some good ore years ago. District is said to be rich but not easily accessible. Idle and apparently moribund.

COPPER KINGS MINING CO. **UTAH.**

Dead. Succeeded by Consolidated Mining & Smelting Co., also dead. Formerly at Brigham, Box Elder Co., Utah.

COPPER KNOB MINE. **NORTH CAROLINA.**

Office: Salisbury, N. C. Mine office: Hopkins, Ashe Co., N. C. Richard Eames, Jr., owner. Lands, 160 acres, freehold, also 90 acres miscellaneous lands, showing a 3' fissure vein in hornblendic slate, carrying carbonate and sulphide ores, mainly bornite, estimated to average 6 to 8% copper, 15 oz. silver and $12 gold per ton. Property was opened circa 1880. Has steam power, with hoist and 2-drill air-compressor, and a 5-stamp mill. Management plans further development by an adit cutting Copper Knob Mountain.

COPPER KNOB MINING CO. **NORTH CAROLINA.**

Dead. Succeeded, circa 1902, by Blue Ridge Copper Mining Co. Formerly at Hopkins, Ashe Co., N. C.

COPPER LEDGE MINING CO. **UTAH.**

Office: care of James Courtney, secretary and treasurer, Salt Lake City, Utah. E. F. Marshall, president. Organized 1907, with capitalization $125,000, shares 25 cents par. Lands, 9 claims, in the Henry district of Sevier county, Utah.

COPPER MILLS SYNDICATE, LTD. **AUSTRALIA.**

Dead. Organized 1906 to operate in New South Wales. Formerly had an office at 6 Gresham St., London, E. C., Eng.

COPPERMINES CO. **NEVADA.**

Office: 66 Broadway, New York, N. Y. Mine office: Ely, White Pine Co., Nev. Wm. B. Thompson, president; Jas. Phillips, Jr., vice-president; Frank W. Holmes, treasurer; T. M. Harriman, secretary; preceding officers, W. Hinkle Smith, Louis Marshall and F. L. Hermann, directors.

Organized May, 1907, under laws of Delaware, with capitalization $60,000,000, as Consolidated Copper Co., and name changed, 1907, to present title, and capitalization increased, April, 1908, to $60,000,000, shares $5 par. Was planned as a holding company, to control, through stock ownership, the properties in the Ely and Bingham camps known as the Guggenheim mines, these being the Nevada Consolidated Copper Co. and Cumberland-Ely Copper Co. at Ely, and the Utah Copper Co. at Bingham. Company was said, August, 1908, to have no floating or current indebtedness, but it is not known whether or not the various properties named are controlled through ownership of stock.

The lands of the Ely Mines Co., 33 claims, area 500 acres, were taken over Aug. 8, 1907, and circa 25 men are employed on development work at that property.

COPPERMINES CO. OF ARIZONA, LTD. **ARIZONA.**

Office: 27 William St., New York, N. Y. English office: 13 Queen Victoria St., London, E. C., Eng. Mine office: Clifton, Graham Co., Ariz. Thos. B. Taylor, president; Wm. C. Shires, vice-president; Luther Martin, second vice-

president; Fred E. Rittman, secretary and treasurer; Maj. Henry Catlin Alex. Veitch, consulting engineers.

Organized Aug. 5, 1907, under laws of Arizona, with capitalizat $10,000,000, shares $5 par, in $5,000,000 cumulative 7% preferred stock $5,000,000 common shares, under title of Copper Co. of Arizona, as a rec struction of the Arizona Amalgamated Copper Co., which was organized un laws of Maine, circa 1906, and name changed, circa 1908, to present tit Annual meeting, first Monday in April.

Company was planned to merge the Stevens, Bonanza, Celtic, Monte Car Keystone-Merritt, Corona, Becker, O'Donnell and Crystalina mining compani in the Clifton district of Graham county, Arizona, for which properti $4,000,000 of stock was to be exchanged. Apparently this was to be comm stock, as company states that $5,000,000 preferred stock is at the disposal the treasury. In December, 1907, predecessor of present company secured e tensions of the bonds on properties under option.

Lands are reported by the company as 168 claims. The Copper Co Arizona claimed to have upwards of 4,000 acres, with a total of about 4 mil of workings, and upwards of 1,000 acres of available mill and smelter sites, a claimed ore reserves exceeding 200,000,000 tons, which was a gross and utter indefensible exaggeration. Company is not regarded favorably.

COPPER MINES OF MOUNT LYELL WEST, LTD. AUSTRALI

Dead. Succeeded, Oct. 2, 1907, by West Mount Lyell, Ltd. Formerly Gormanston, Montagu Co., Tasmania. Described Vol. VI.

COPPER MINES & SMELTERS CORPORATION OF AMERICA. CALIFORNI

Office: 417 Montgomery St., San Francisco, Cal. Letter returned unclaim from former mine office, Vontrigger, San Bernardino Co., Cal. E. H. Kram president; C. H. Dunsmoor, vice-president; T. Wilkinson Tetley, secretary a treasurer; preceding officers, W. E. Ewing, E. H. Geary, Louis Hogan and E. Sichel, directors. Organized July 16, 1907, under laws of Arizona, with capit ization $5,000,000, shares $5 par. Annual meeting, first Monday in January.

Is said to have absorbed, circa September, 1907, the Green Dragon Cop Co. and the Dessie Boyer Copper & Gold Mines, Ltd. Lands, 12 claims, fractional, area 220 acres, in the Signal district, opened by shafts of 30' a 90' on the Humming Bird claim, 2 miles from Vontrigger. C. Marcereau Gar son is reported by company to have estimated 9,000,000 tons of ore in sig but either Mr. Garrison is subject to strange optical illusions, or has be grossly slandered. Company is not regarded favorably.

COPPER MINING & DEVELOPING CO. CALIFORNI

Office: care of J. B. Campbell, president, Fresno, Cal. Mine office: Kawe Tulare Co., Cal. Lands, 50 claims, area circa 1,000 acres, on Kearsarge Pe 35 miles east of Kaweah, slightly developed, showing carbonate and sulphi ores, assaying 2 to 25% copper. Idle several years and moribund.

COPPER MINING & SMELTING CO. OF ONTARIO, LTD. ONTARI

Office: 6 Broad Street Place, London, E. C., Eng. Mine office: Bru Mines, Algoma, Ont. T. Hayes Sheen, president and general manager; C. Osborn, secretary; H. J. Carnegie-Williams, superintendent. Organized A 16, 1905, under laws of Ontario, with capitalization $1,000,000, shares $5 p Property is the old Bruce mines, area 12,800 acres, freehold, on Georgian B Mine, worked 1846-1876, producing copper to value of circa $3,500,000, several tunnels and 10 shafts of 75' to 450' depth, with about 3 miles of wo ings. Mine has several parallel veins, with strike of 15° West of North dip of 85° to 90°, there being 6 known veins, of which 2, of 4' to 10' wi traversing diabase, are developed, carrying mainly chalcopyrite with occasio bornite and chalcocite, with quartz gangue, estimated to average 5% cop

al workings are shafts Nos. 2, 3 and 4, latter 453′ deep, upper levels of ing stoped out. Waste burrows of mine contain about 125,000 tons, d to carry 1.5% copper.

ipment includes a 400-h. p. steam plant, with 4 hoists of 25 to 150-h. p. ter with double drums of 36″ face and 60″ diameter. Has a 16-drill -compressor, 35-kw. dynamo and 14 mine buildings, including a 25x60′ shop.

and mill, 1½ miles apart, are connected by the tracks of the Bruce Algoma Railway. The 200-ton concentrator, of wood and iron, 75x192′, stin crusher, 5 sets of rolls, 12 Hartz jigs, 18 Frue vanners, 2 double- tables and 18 sizers. Miscellaneous improvements include 3 docks, barf, merchandise wharf, electric light plant and telephone system. duction of mine, under old management, was 40,461 long tons of con- of about 20% average copper tenor, equivalent to circa 8,000 long copper.

MOUNTAIN CONSOLIDATED MINING CO. **CALIFORNIA.**

r returned unclaimed from former mine office, Copley, Shasta Co., l Grotofend, superintendent. Property is the Sugar Loaf mine. Has ower. Idle.

MOUNTAIN COPPER CO. **ALASKA.**

office: Nome, Alaska. Property is sundry claims near the head of river, on which development work was in progress, late 1907.

MOUNTAIN DEVELOPMENT CO. **CALIFORNIA.**

Succeeded by Copper Mining & Developing Co. Formerly at Tulare Co., Cal.

MOUNTAIN MINING CO. **CALIFORNIA.**

r returned unclaimed from former office, 310 Laughlin Bldg., Los Cal. Mine office: Victor, San Bernardino Co., Cal. W. A. Cooper, J. S. Longley, secretary; J. A. Morlan, manager. Lands, 10 claims, the Amazon mine, showing a 200′ gossan outcrop, opened circa ened 1901. Main shaft, 200′, shows sulphide ores assaying 8 to 10% s claimed to have about 10,000 tons of ore on the dump, which is Idle and apparently moribund.

MOUNTAIN MINING CO. **COLORADO.**

: Ward, Boulder Co., Colo. Geo. W. Barnhardt, superintendent. out 1 mile north of Ward, have a 50′ tunnel, showing a 6′ vein, assay- in gold and silver.

MOUNTAIN MINING CO. **NEVADA.**

Formerly at Tecoma, Elko Co., Nev.

MOUNTAIN MINING CO. **UTAH.**

: care of B. T. Lloyd, superintendent, 323 D. F. Walker Bldg., Salt , Utah. Mine office: Milford, Beaver Co., Utah. Lands, 6 claims, merly by Copper Mountain Mining & Milling Co., having open-cuts w shafts of 5′ to 60′, and a main shaft, of peculiar construction, about pth, showing an iron ore vein of 4′ to 14′ width, giving assays of copper. Shaft is vertical for about 100′, thence drops 100′ at an 5°, thereafter has 50′ sunk at an angle of 70°, which is excellently ering. Has gasoline power. Presumably idle.

MOUNTAIN MINING CO. **WYOMING.**

Formerly at Big Horn, Sheridan Co., Wyo., and Rudefeha, Carbon Described Vol. VI.

MOUNTAIN MINING & DEVELOPMENT CO. **IDAHO.**

and mine: Mullan, Shoshone Co., Idaho. James I. Dickinson, presi- anized 1906, under laws of Idaho, with capitalization $1,500,000,

shares $1 par. Lands, 8 claims, 1 fractional, on Copper Mountain, just e
of Mullan, having a 500′ tunnel, showing bornite.

COPPER MOUNTAIN MINING & DEVELOPMENT CO. **WASHINGTON & BRITISH COLUMBI**

Office: 5406 Union Ave., South Tacoma, Wash. Mine offices: Ryan, Stev
Co., Wash., and Quatsino, Atlin district, B. C. B. S. Cowles, president; J
Hutchinson, secretary; B. D. Holcomb, general manager; A. T. Macaulay, sup
intendent. Capitalization $200,000, shares 10 cents par. The Washingt
group has 4 claims, area 90 acres, with 3 ore bodies, one lens 75′ wide bei
opened by a 300′ shaft and a 115′ tunnel. The June group, at Quatsino Sou
includes 5 claims, area 258 acres, showing an ore body said to be 100′ wi
with measured length of 3,000′, giving assays of 6 to 8% copper, 3 oz. silv
and $2 gold per ton, from chalcopyrite. A large amount of ore is shown
surface, and the deposit has been worked open-cast. British Columbian gro
considered promising. Both groups idle for several years.

COPPER MOUNTAIN MINING & MILLING CO. **IDAH**

Office and mine: Mullan, Shoshone Co., Idaho. J. A. Grenier, presiden
W. Wyman, secretary. Lands, 8 claims, on Copper Mountain, east of the Sno
Storm, developed by tunnel.

COPPER MOUNTAIN & MILLING CO. **UTA**

Dead. Was bankrupted, 1904, by bad management. Formerly at Milfor
Beaver Co., Utah. Fully described Vol. IV.

COPPER MOUNTAIN MINING & SMELTING CO. **MONTAN**

Office: Phoenix Bldg., Butte, Mont. Mine office: Corbin, Jefferson C
Mont. J. H. McCabe, manager; J. S. Cohen, secretary. Organized 1907, wi
capitalization $1,000,000. Lands, circa 50 claims area about 1,000 acres,
cluding 5 claims on Valparaiso Hill, also claimed by Butte & Corbin Conso
dated Mining Co., and title vested in latter by judgment of court June 7, 19
Has a shallow shaft, showing numerous stringers of ore assaying circa 6
copper, with small silver values, and is said to have a 15′ vein with 15″ pa
streak. Idle.

COPPEROPOLIS COPPER CO. **OREGO**

Letter returned unclaimed from former office, 503 McKay Bldg., Portlan
Ore. Mine office: Prairie City, Grant Co., Ore. J. L. Hartman, presiden
H. W. Prettyman, vice-president; W. W. Gibbs, treasurer and general manage
N. A. Butcher, secretary. Organized 1900, under laws of Oregon, with capita
zation $120,000, shares 10 cents par.

Lands, 10 claims, 2 patented, area 200 acres, and a 2-acre millsite, in t
Quartzburg district, showing 2 ore bodies between diorite and porphyry,
which one, of 50′ to 60′ estimated average width, is opened by a 1,500′ tunn
showing chalcopyrite giving average assays of 3% copper, 1.5 oz. silver a
$1.50 gold per ton. Has steam and gasoline power, a 2-drill air-compressor a
8 mine buildings.

A 50-ton mill, 50x60′, of wood, equipped with crusher, rolls and jigs, p
about 10 into 1, concentration not being very close, with heavy losses
tailings, concentrates ranging in tenor from 19 to 24% copper, 3 to 22
silver and $2.16 to $6.40 gold per ton. Property considered promising, b
mill was built before the mine was opened adequately. Idle from lack
funds, and apparently moribund.

COPPEROPOLIS MINING CO. **NEVAD**

Office: Nixon Blk., Goldfield, Nev. J. W. McLisle, president; H. Tidw
vice-president; H. C. Hamlin, secretary; J. P. Marshall, treasurer. Lands, s
posedly in Esmeralda County, Nevada, are said to have a 30′ vein, betw
limestone and schist, with schistose gangue, carrying good gold and sil
values.

OPOLIS MINING & LEASING CO. **WASHINGTON.**
e: 3 Marion Blk., Indianapolis, Ind. Mine office: Keller, Ferry Co., H. Hibschman, president; Geo. P. Garwood, secretary and manager; officers, F. E. Stone, G. D. McClain and M. Hibschman, directors. circa 1907, under laws of Washington, with capitalization $3,000,000, 0 par. Lands, 6 claims, 3 fractional, area circa 90 acres, 5 miles west opened by a 60′ tunnel, showing low grade chalcopyrite.

OSITY MINE. **ARIZONA.**
office: Vekol, Pinal Co., Ariz. Wm. Forbach, superintendent. Has a nt, installed 1907.

PLATE & ARIZONA MINING CO. **ARIZONA.**
r returned unclaimed from former office, Duluth, Minn. Mine office: Graham Co., Ariz. Ambrose Burke, superintendent, at last accounts. 1904, with capitalization $5,000,000. Lands are the Copper Plate Chase Creek, said to show a 5′ vein of milling ore in the breast of a el. Idle.

PLATE MINING CO., LTD. **IDAHO.**
Formerly at Mullan, Shoshone Co., Idaho.

PRINCE CONSOLIDATED MINING CO. **UTAH.**
: Salt Lake City, Utah. Letter returned unclaimed from former mine a, Salt Lake Co., Utah. Anthony O. Jacobson, president; Clarence nick, vice-president; Chas. H. Post, secretary. Organized 1904, with tion $500,000, shares $1 par. Lands, 3 groups, near the Continental-Columbus Consolidated, from which $900,000 worth of ore is said to shipped in the past. Apparently moribund.

PRINCE MINING CO. **CALIFORNIA.**
: care of J. C. Ruddock, secretary, Ukiah, Cal. Mine office: Middle-te Co., Cal. E. Lobree, president, at last accounts. Lands, 3 claims, tunnel and trenches. A vein of 6′ to 8′ width, in limestone, has ays of 5% copper, 1 oz. silver and $3 gold per ton. Idle for some l apparently moribund.

PRINCE MINING CO. **CALIFORNIA.**
r returned unclaimed from former office, Daggett, Cal. Mine office: k, San Bernardino Co., Cal. Frank Durham, Jr., president; Chas. ice-president; L. W. Flournoy, treasurer; Col. D. K. B. Sellers, secre-eding officers, Theron Flower and Washington Hall, directors. Or-May, 1907. Presumably idle.

PRINCE MINING & SMELTING CO. **COLORADO.**
office: Copperfield, Frémont Co., Colo. Mine, in the Red Gulch dis-ped ore, 1907, running 31% copper.

QUEEN CONSOLIDATED MINING CO. **ARIZONA.**
: 99 John St., New York, N. Y. Mine office: Bisbee, Cochise Co., orks office: Douglas, Cochise Co., Ariz. Prof. Jas. Douglas, president; mes, vice-president; Geo. Notman, secretary and treasurer; Walter general manager; Arthur Woodman, assistant general manager; herman, mine superintendent; Geo. B. Lee, smelter superintendent; lton, assistant smelter superintendent; G. H. Dowell, ore purchaser; ine, auditor; W. H. Brophy, store manager; J. S. Taylor, Jas. Finley Devine, mine foremen.
ized August, 1885, under laws of New York, with capitalization shares $10 par. Was said to have paid $5 per share quarterly divi-1906. Is operated as a close corporation, and is said to have only shareholders.
t 4,000 men are employed, of whom approximately 2,500 are at the 1,500 at the smelter.

Lands are upwards of 1,000 acres, including various mines here
scribed in detail. The mine is opened ahead for about 8 years,
reserves being among the richest and most extensive ever develo
property. In December, 1907, new openings aggregated 5,600′. Ore
so soft that it is difficult to secure the mine openings, especially as
hill above the mine is creeping, and serious crushes can be avoid
heavy timbering and the exercise of great care. Many of the stope
headed throughout, and the mine is timbered with square sets of
12x12″ timber, mainly Washington fir, an average of 30′ of tim
measure, being required for each ton of ore won. All ore is hand-so
ground, after breaking, and culls used for filling in worked-out
material standing remarkably well. Notwithstanding numerous dis
of operation and menaces to life, the Copper Queen is one of th
mines for underground workmen, an evidence of able and experienc
ment.

The mine has electric pumps, there being three 300-gallon pu
Czar shaft, two of 100 gallons each at the Holbrook, two 50-gallon p
Silver Spray, and two 100-gallon pumps at the Lowell. Lead-lined pu
are used, to obviate excessive corrosion from acid mine-waters. T
a whole, is not especially wet, the district being drained largely by t
& Pittsburg.

The entire system of mine operation was changed, radicall
Formerly each of the principal shafts was operated as a separate m
5 old shafts are now used only for men, waste, timber and supp
extraction being through the Sacramento shaft. The haulage syste
6 miles of tracks, on the 400′, 600′, 800′, 1,000′ and 1,200′ levels.
complete this traction system it was necessary to open many new
crosscuts, which have been located in solid ground, wherever poss
electric tram-lines are the arteries of the mine. The haulage syste
man locomotives and side-dumping ore cars. Chutes have bee
throughout the mine, for loading the motor-cars, which discharge
storage bins, from which the skips are loaded.

The mine was opened, 1880, on a solid outcrop of oxidized
and manganese, opposite the Copper Queen hotel in Bisbee. The
body, since removed, leaving a large artificial cave, gave average
23% copper, smelted in a 30″ water-jacket furnace, with English co
via San Francisco, but was exhausted in three or four years, an
experienced many vicissitudes, until additional and far larger ore
developed, by following seams and stringers of ore wherever occ
almost invariably leading to further large and rich ore deposits.
tion of the Copper Queen, and other mines of the district, consists
of two dolomitic limestone beds, of Carboniferous age, the upper wh
lower blue, dipping to the southward and flanking a granite-porphyr
intrusive porphyritic dikes. Until 1902 the principal ore bodies
at the base of the upper limestone bed, which is much broken and
by feldspathic, igneous, intrusive rocks, that evidently have a
bearing upon the ore deposits, which occur in pockets, lenses,
bunches, chutes, veins, stringers and seams, the larger bodies being
in most cases, by small veins, or mere knifeblade seams. The limest
included ore bodies have a general pitch to the southeast, somew
than the pitch of Tombstone Cañon, necessitating deeper shafts as
made toward the southeast. Extensive bodies of high-grade ore
found, since 1902, in the underlying limestone strata, and developm
these underlying ore bodies to be persistent to great depth.

All of the Copper Queen's deep shafts are bottomed in dissen

es of high grade, consequently the depth of the ore bodies, while already great, is conjectural. The mines show numerous beautiful caves, lined lcite, some of these being of considerable size, and frequently found in ociation with good ore bodies. Rich oxidized ores are found on the level, with chalcocite and bornite occuring above azurite, malachite, and even considerable bodies of native copper. The larger masses of metal, ranging up to several hundredweights, and even tons, have been ainly, not in the upper levels, as might have been expected, but at con- e depth. There is much talc and hematite, with frequent occurrences anese, in connection with the ore bodies. Only oxidized ores were until 1893, when converters were added to the smelting plant, since me the furnaces are charged with a mixture of oxide, carbonate and ores, perhaps one-third of the charges being sulphide ores, the ores giving average returns of better than 7%. The system of assaying the mine gives no figures regarding ores richer than 15%, and the occurrence of the figures "15+," on the assay books of every shaft, to the wonderful richness of the ore bodies.

Czar shaft, the oldest of the present workings, is 400' deep, with an hoist. The old shops and smelter were located on a narrow bench of made by grading the steep hillside above the Czar. The old smelter dismantled, but some of the shops remain.

Holbrook mine lost its old shaft, by fire and caving, this being re- 1907, by a new 4-compartment shaft, 540' deep, located circa 1,100' t of the Czar. Surface equipment includes a steel gallows-frame and p. hoist actuated by compressed air. The Holbrook is the principal the Copper Queen, having large and numerous bodies of exceptionally de ore.

Hayes shaft, between the Holbrook and Silver Spray, is out of com- having been replaced by the latter some years ago.

Silver Spray shaft, commonly known as the Spray, circa 1,400' south- he Holbrook and near the Irish Mag shaft of the Calumet & Arizona, deep, with 3 compartments, retimbered, 1907, having become badly This shaft shows rich ores from the fourth level to the bottom, the orkings carrying mainly chalcocite, which changes to bornite on the el, with oxidized ores and a continuance of sulphides on the sixth nth levels, ores being mainly sulphide on the eighth level. The ore re very extensive and persistent, but most erratic in nature, with porphyry dykes. A considerable body of native copper was cut on and again on the 800' level, thus setting at defiance some deeply geological theories regarding ore deposition. A 20x60" Nordberg oist, actuated by compressed air, operates 3-deck cages.

Lowell shaft; southeast of the Irish Mag, is 1,447' deep, showing no ore bodies above the 900' level, but having high grade sulphide ores wer workings, the 1,000' level showing high grade oxidized ores below This shaft makes circa 175,000 gallons of water daily, which is surface by a Prescott station pump on the 1,000' level. A 20x60" hoist, operated by compressed air, raises 3-deck cages, and the shaft el headgear.

3-compartment 1,100' Gardner shaft, 1,450' southeast of the Silver s large bodies of high grade sulphide ore. Surface equipment in- 0' steel gallows-frame and a 750-h. p. Nordberg 20x60" hoist, actuated

0' Cuprite shaft, circa 1,400' west of the Silver Spray, is connected ed with the Czar. No large ore bodies have been located by this

shaft, though it should find the extension of the ore bodies of the
Arizona.

The Uncle Sam has an old shaft, and a new shaft, sunk 1907-1908
500′ depth, connected with the Czar and Holbrook mines.

The White Tail Deer shaft, lying some distance south of the m
ings, is reached by road through a detour of several miles, and was ope
1893, to 100′ depth on the incline, and some high grade ore was shipp
by lessees, running 12 to 15% copper. The mine shows a large bod
grade ore.

The 4-compartment 1,200′ Sacramento shaft is planned to handle t
output of the mine, having a hoisting capacity of 4,000 tons daily,
loading bins on the various levels served by the electric haulage sy
Sacramento being connected with all the other workings of the m
shaft was sunk in rock for practically the entire distance, insuring
a degree of immunity from drawing as is possible in this district. T
mento hoist is a powerful Nordberg tandem compound engine, with
having a 5′ face, the hoist being operated by steam, with 6 auxiliar
actuated by oil, under 150 lbs. pressure. Hoisting is by 3-ton skips
arrangements for uninterrupted hoisting, to the capacity of the s
unusually complete.

The Sacramento shaft has perhaps the most elaborate and bes
system for mixing and loading ores to be found at any copper
reaching surface, in the shafthouse, ore is dumped automatically
Stephens-Adamson belt conveyor, which carries the ore about 150′
hill to the loading tracks. The loading shed is 42x800′, of steel fr
4 railroad tracks running beneath, cars being loaded from 2 convey
running lengthwise between the 4 tracks, ore being scraped off the
dumping carriages moving continually back and forth, the motion m
ore thoroughly. Every tenth skipload is weighed automatically, a
into a special car for sampling and checking purposes.

A precipitation plant, built 1906, at the Czar shaft, on the site o
smelter, has a series of vats and launders, taking mine water, from
brook and Czar shafts, which is heavily charged with copper su
solution The two monstrous slag-dumps near the Czar shaft, remain
the old smelting plant, are being broken up and shipped to Dougl
smelting.

Formerly each shaft had its own independent power plant, but t
replaced, 1908, by a central power plant that effects large savings.
power plant, between the Sacramento and Gardner shafts, has an eng
and boiler-house, both of steel frame. Equipment includes four 400-h. p
boilers, 3 Curtis 500-kw. turbo-generators, 3 Ingersoll-Rand air-co
with aggregate piston capacity of 9,300 cubic feet of free air per mi
various smaller machinery. Fuel is Texas and California petroleum, w
tanks for oil storage

The mine machine-shop, 66x150′, of steel frame, located on Sa
Hill, near the power plant, includes a smithy and boiler-shop. Mine
include a considerable number of minor shops, warehouses, changing-h
offices. All of the shafts and the principal mine buildings are re
spurs of the El Paso & Southwestern railway, the railroad line at t
having been rebuilt, 1907, with better grades.

The smelter, known as the Douglas reduction works, is at Douglas,
28 miles from the mine and 1 mile from the Mexican border. This
designed as a central smelter for the mines of Phelps, Dodge & Co. in
and Mexico, these including the Copper Queen at Bisbee, the Detroit at
the Old Dominion at Globe, the Moctezuma at Nacozari, and the

at La Cananea. These properties produce a great diversity of copper ncluding those of practically every grade and character found in the an southwest and in northern Mexico, and it is possible, by means of ntral reduction plant, to take advantage of the varied nature of the mixing furnace charges. This plant also does a considerable custom s, on copper, gold and silver ores.

works occupy a site of 320 acres, and are served by a very complete railroad system, of standard gauge, that reaches every building and ent of the plant, there being about 15 miles of railroad track, includ- n line and sidings. Construction of the plant was begun May, 1901, first stack was blown in March, 1904, since which time there has been continuous enlargement, and the works, costing circa $4,000,000, are n size only to the mammoth Washoe smelter, having a daily smelting of about 4,000 tons.

ter for the works is secured from artesian wells of about 300′ average ater rising nearly to the surface, with one well, of circa 1,000′ depth, 200 gallons per minute. A large reservoir and cooling tower have been connection with the water supply.

ore bedding system at the works consists of 5 pits, the fifth having lt 1908, each 40x800′ in size, and 11′ deep, having an aggregate storage of circa 90,000 tons. Ore, received from the mine in side-dumping s, is discharged into the pits, which are lined with white tufa. The filled with the different grades of ore required to constitute a normal mixture, and mixed by a mechanical plow, while ore is removed there- required at the furnaces, by steam-shovels running on permanent tracks n the floors of the pits.

oining the furnace building is a steel trestle, 48′ high and 1,343′ long, into sections, with storage bins for coke, fluxes and silica.

sampling mill, 65x235′ in size, of steel and brick, has 3 crushers, 6 2 Vezin automatic samplers.

steel blast-furnace building, twice enlarged, is 160x775′ in size, in- also the converter department and relining plant, and is equipped with -ton 5-motor Morgan traveling cranes, of 60′ span, running the entire f the building. There are ten 400-ton blast-furnaces, each 44x240″, with tuyeres, and a height of 16′ from the tuyeres to the charging floor. The ces are set 15′ apart, in a single line, with one settler between each pair, being 10′ wide and 20′ long, lower half lined with chrome brick and lf with ordinary fire-brick. Slags skim through 2 spouts into 18-ton , hauled by electric locomotives, the slag being used for grading by Paso & Southwestern railway. Ore is charged on either side, alter- harging being done from trains of 20 cars, each car carrying 2,500-lb. hauled by 13-ton electric locomotives.

dust chamber is of steel frame, with brick walls, roofed with rein- nerete supported by steel trusses, and has a bottom of tiled hoppers. e is one large reverberatory furnace in the slag-yard south of No. 6 nace. This has been run experimentally, taking charges of flue dust mixed with converter slags. The experiment has not proven entirely l. The original plans called for 4 additional reverberatories, giving ch pair of blast-furnaces.

n matte is taken from the blast-furnaces to the converters by two rgan electric traveling cranes, each having two 15-ton auxiliary hoists. erter department has 8 stands, operated hydraulically, with 36 shells l-known Copper Queen barrel type, 96x126″ in size. Copper is poured er casting machine. The lining department has 3 grinding pans, with machinery for tamping.

The steel stack of the furnace building, 30′ in diameter at the ba 25′ at the top, was 200′ high, but a 60′ extension was added, 1906, by th consin Bridge & Iron Co. The new section, weighing 40 tons, built w scaffolding at the top of the old stack, upon the windward side, was into position and riveted on within a few hours after completion, witho suspension of smelting.

The power-house, of steel and brick, repeatedly enlarged, is now 12 in size, and has about 20 engines of various sizes and types, aggregating than 6,000 h. p., for different uses. The equipment includes 4 Nordberg compound blowing engines, each direct-connected to a 400-kw. 250-volt current generator; Nos. 9 and 10 Connersville blowers, set staggering; a compound 2-stage condensing air-compressor, with piston capacity of cubic feet of free air per minute, at 100 lbs. pressure, for running pneu tamping machines, operating charging doors of the blast-furnaces and pu water; 3 triplex motor-driven pumps, delivering water into compression at 350 lbs. pressure per square inch, with automatic regulation; four 40 250-volt direct current generators, supplying power for cranes, slag locom and electric light, and a number of minor engines and dynamos.

The 85x205′ steel boiler-house has six 500-h. p. and four 1,000-h. p. St water-tube boilers, with a Green fuel economizer and a Foster superheater capacity of 90,000 lbs. of steam per hour. The stack of the boiler-house brick, 13′ in diameter at the base, and 177′ high. Boilers are arranged to either coal or petroleum, but latter is used exclusively, consumption of fornia and Texas petroleum, at the mine and works, amounting to about 50 gallons monthly. Oil for fuel is cheaper in first cost, easier and cleanli handle, and effects a great saving in the wages of 3 daily shifts of st formerly required at every boiler plant.

The machine-shop, 80x204′, of steel and brick, is fitted with a very plete line of shop tools, capable of handling the heaviest work.

The boiler-shop, 85x120′, of steel and brick, is exceptionally well equi and can repair locomotive boilers.

The smithy, 90x120′, of steel frame, is equipped as thoroughly as the shops, and is capable of handling forgings of considerable size.

The foundry, 80x90′ in size, of steel frame, has both iron and brass cu turning out iron castings up to many tons in weight. The shops at the Do works can do, not only any ordinary or extraordinary repair work, but, pinch, are capable of manufacturing heavy machinery.

Miscellaneous shops at the smelter include a combination sawmill planing mill, 95x120′ in size, well equipped with wood-working tools.

Miscellaneous buildings at the Douglas works include an office and house, various minor shops and a considerable number of neat dwelling employes.

A limestone quarry, at Lee station, 7 miles east of Douglas, has a crusher and storage bins, the requirements of the smelter being 400 t tons of limestone daily, for flux.

The El Paso & Southwestern railway, owned by Phelps, Dodge & Co., serves the Copper Queen mines and works, has some 300 miles of main line though designed solely as an outlet for the Phelps-Dodge mines, has deve a previously inaccessible district, rich in natural resources. One result construction of this line has been the building of the new town of Do named in deserved honor of the president of the Copper Queen, which bustling young metropolis of some 15,000 population, already a strong petitor of El Paso as a custom smelting point, taking ores from Arizona, Mexico, Sonora and Chihuahua.

A sawmill is operated, in the Chiricahua Mountains, though the bo

the timber and lumber requirements of the mine and works are met by the importation of timber from the Pacific coast.

The company maintains, at Bisbee, an enormous department store, that carries a stock larger than can be found in most cities of twice the size. This store has extensive branches, at Lowell, Douglas and Naco. There is, however, no compulsion of employes, who are at perfect liberty to buy goods of any of the numerous and flourishing independent mercantile establishments of Bisbee and Douglas.

The Copper Queen has a large and well equipped hospital at Bisbee. The company also owns, at Bisbee, a fine 4-story hotel, and maintains libraries and reading-rooms for employes at both Bisbee and Douglas. At Bisbee there is a handsome 3-story gymnasium, having baths, bowling alleys and a large auditorium, in which scientific and popular lectures are given frequently.

Relations of the Copper Queen with its employes have been notably cordial for many years, though some trouble was had, 1906-1907, through a strike called by the Western Federation of Labor. Efforts were made, at different times, to unionize the Bisbee camp, but, early in 1906, a referendum vote of the mine-workers was taken on this point, no bosses or other salaried employes being allowed to vote. The polling was conducted on the Australian system, with complete poll-lists, inspectors and guards, and was absolutely fair, resulting in a vote of more than 5 to 1 against forming a union of the Western Federation of Miners, notwithstanding which the Federation promptly organized, in violation of the spirit of the vote, and immediately thereafter called a strike. This was maintained for some months, backed by all the power of a strong labor union, but, though causing more or less trouble, resulted in a disastrous defeat for the Federation, and Bisbee is now an open camp. The mine workers have not suffered, however, as wages have been maintained at the high level set by the Copper Queen many years ago, and the 8-hour system continued. The attitude of the miners employed by the Copper Queen is that, inasmuch as they are obtaining all the benefits demanded by the miners' union, without any of the strikes and other troubles usually attendant upon the existence of the union, they are satisfied to leave matters as they have been for 20 years past.

Production was 64,570,847 lbs. fine copper in 1905; 71,711,813 lbs. fine copper, 332,311 oz. silver and 7,573 oz. gold in 1906, and 66,916,972 lbs. fine copper, 338,723 oz. silver and 4,197 oz. gold in 1907. The ultimate productive capacity of the Copper Queen cannot be rated at less than 100,000,000 lbs. yearly. The mine is one of the best in existence, and both mine and works have grown wonderfully within the past few years, the mining and reduction plants now being among the best in existence. The management is exceptionally farsighted and capable, and deserves the highest commendation for the friendly and helpful spirit shown in dealings with employes, and for the neighborliness that has impelled the Copper Queen to lend a helping hand to the lower mines at Bisbee.

COPPER QUEEN CONSOLIDATED MINING CO. **WYOMING.**

Dead. Formerly at Dillon, Carbon Co., Wyo.

COPPER QUEEN CONSOLIDATED MINING & MILLING CO.

Office: 500 Auerbach Bldg., Salt Lake City, Utah. Moribund.

COPPER QUEEN GOLD MINING CO. **ARIZONA.**

Office: Mayer, Yavapai Co., Ariz. J. S. Johnson, superintendent. Lands, across the Agua Fria river from the Binghamton mine, show argentiferous and auriferous copper ores. Was developing with a small force at last accounts.

COPPER QUEEN GROUP MINING CO. **COLORADO.**

Office: 723 Oddfellows Bldg., St. Louis, Mo. J. G. Bolmer, president;

C. A. Weber, vice-president; M. M. Clemmons, secretary and treasurer. Organized 1901, under laws of Colorado. Lands, 6 claims, patented, in the El Mountain district of Gunnison county, Colo., having about 600' of workings said to have produced several thousand dollars' worth of ore under previous ownership. A tunnel to undercut this and adjoining properties, being driven by the Usona Mining Co., at last accounts, was planned to intersect the Copper Queen vein about one-half mile below surface. Idle since 1903, but selling stock at last accounts.

COPPER QUEEN, LTD. BRITISH COLUMBIA

Dead. Dissolved, August, 1904. Formerly at Nelson, Kootenay district, B.

COPPER QUEEN MINE. BRITISH COLUMBIA

Office: care of Edw. B. Cox, manager, Seattle, Wash. Mine office: Van Anda, Texada Island, B. C. Harry Wild, superintendent. Lands, crown granted, near the Cornell and Marble Bay mines, carry bornite and chalcopyrite ranging in tenor up to 8% copper, 2.5 oz. silver and $1 gold per ton. Has a 500' main shaft, with a 180' winze. Presumably idle.

COPPER QUEEN MINE. COLORADO

Office and mine: care of Miss Nettie Hornbeck, owner, Silverton, San Juan Co., Colo. Lands, 8 claims, area 160 acres, on Sultan Mountain, opened by 70' contact tunnel showing ore assaying 15% copper and $25 gold per ton, with small silver values.

COPPER QUEEN MINE NEW MEXICO

Mine office: Jarilla, Otero Co., N. M. Wm. Wade, manager, at last account. Lands, in the northern part of the Jarilla Mountains, show a 14' vein of sulphide ore assaying circa 8% copper, with small gold and silver values. Presumably idle.

COPPER QUEEN MINING CO. IDAHO

Office and mine: Mullan, Shoshone Co., Idaho. E. B. Crawford, president and general manager; Tennes Nelson, vice-president; C. B. Boyden, secretary; Dr. E. D. Keys, treasurer. Organized 1906, with capitalization $1,000,000. Lands, 7 claims, known as the Stevens Peak group, at the head of Willow Creek, having a 400' tunnel cutting a vein, supposed to be the Reindeer, of estimated width, carrying a 12" paystreak of massive chalcopyrite, assaying 20 to 30% copper, with fair silver values, balance of vein being spathic iron ore impregnated with low-grade chalcopyrite of concentrating tenor. Has a 86' tunnel and plans running, jointly with the Reindeer, a tunnel of circa 2,800' giving a back of circa 775' on the Reindeer and circa 1,200' on the Copper Queen.

COPPER QUEEN MINING CO. WASHINGTON

Mine office: Chewelah, Stevens Co., Wash. Lands, 6 claims, held under $33,500 bond and lease.

COPPER QUEEN MINING CO.

Dead. Formerly had an office at 542 Rookery Bldg., Spokane, Wash.

COPPER QUEEN MINING CO., LTD. ONTARIO

Dead. Succeeded, 1905, by Calumet & Algoma Mining Co. Formerly at Bruce Mines, Algoma, Ont.

COPPER QUEEN MINING & SMELTING CO. IDAHO

Office: 409 Providence Bldg., Duluth, Minn. Mine office: Grant, Beaverhead Co., Mont. T. E. G. Lynch, president; B. F. White, vice-president; A. McLennan, secretary and treasurer; Geo. H. Crosby, general manager; Emerson Hill, superintendent; preceding officers, Dr. C. W. McFadden and J. C. McFadden, directors. Organized June 12, 1905, under laws of Arizona, with capitalization $500,000, shares $1 par. Absorbed, circa 1908, the Queen & Crescent Mining Co., giving one share for eight.

Lands, 23 claims, on Agency creek, in Lemhi Pass, in the Eureka district

of Lemhi county, Idaho, 38 miles from the Oregon Short Line railway. Property includes the Queen & Crescent group of 17 claims, and the Copper Queen group of 6 claims, latter carrying 8 fissure veins, in schistose quartzite, of which 4, under development, range from 15" to 15' in average width, showing mainly bornite, with occasional chalcocite and chalcopyrite, said to give average assays of 15% copper, 5 to 10 oz. silver and $15 gold per ton. Development is by shafts of 100' and 140', and by 7 tunnels, longest 425', with circa 2,000' of workings.

Equipment includes a steam plant with 3 boilers, 2 hoists and a 3-drill and air-compressor. There are 10 buildings, including a log mill having 10 gravity stamps, 2 concentrators and Wilfley tables. In January, 1908, shipped carloads of ore assaying circa 45% copper, 8 oz. silver and $20 gold per ton. Is developing with force of 16 men. Property considered promising and management good.

COPPER RANCH GOLD MINING & MILLING CO. **COLORADO.**

Office: 1711 Tremont St., Denver, Colo. W. E. Alexander, president; T. E. Fisher, vice-president; Thos. Fielding, secretary. Organized under laws of Colorado, with capitalization $1,000,000, shares $1 par. Lands, 170 acres, patented, in the Grand Island district of Boulder county, Colorado, opened by a 12' shaft, with circa 350' of drifts. In May, 1903, advertised that there was no risk in buying this stock, as dividends would be paid in a few months. Was still selling stock, 1906, advertising its property as a tungsten mine, with no dividends paid, and no prospects of dividends. Is not regarded favorably.

COPPER RANCH MINING CO. **UTAH.**

Office: 323 D. F. Walker Bldg., Salt Lake City, Utah. Letter returned unclaimed from former mine office, Milford, Beaver Co., Utah. Moses Thatcher, president; C. L. Rood, vice-president; Benj. T. Lloyd, secretary and treasurer. Organized under laws of Utah with capitalization $500,000, shares 50 cents par.

Lands, 17 claims, area circa 340 acres, between the Old Hickory and O. K. mines of the Majestic company, carrying circa 2 miles of the strike of a vein of about 100' width, opened at intervals for a mile, showing ores assaying up to 4% copper, 10 oz. silver and $8 gold per ton. Management estimates that entire vein will average 4 to 7% copper, with fair gold and silver values, which is a serious overestimate. Ore carries 5 to 25% iron, rendering it desirable for fluxing purposes. The mine has but slight development, with a shaft, poorly timbered, 32' deep on the incline and 43' farther vertically, mainly in ore. Said to have been bonded, early 1907, for 18 months, to E. H. Wilson, R. N. Hertzig and John W. Compton, for $75,000. Property considered promising, but out of work and idle several years.

COPPER RANGE CO. **MICHIGAN.**

Office: 82 Devonshire St., Boston, Mass. Mine office: Painesdale, Houghton Co., Mich. Wm. A. Paine, president; Chas. H. Paine, vice-president; Frederic Stanwood, secretary and treasurer; preceding officers and Chas. A. Snow, directors; F. W. Denton, general manager.

Organized 1899, under laws of Michigan, with capitalization $2,500,000, shares $25 par. Is controlled, through ownership of 99,674 shares out of the total issue of 100,000, by the Copper Range Consolidated Co. Owns 50,000 shares of Champion Copper Co., being one-half the total issue, and 26,051 shares of Copper Range Railroad Co. Income, 1907, was $502,913.97, of which $500,000 came from dividends on stock of Champion Copper Co., $2,749.97 from interest and $114 from rentals. Disbursements, 1907, were $545,532.75, including $450,000 paid in dividends. Ended 1907 with $69,146.55 cash on hand, and liabilities of only $427.06. Dividend record is as follows: $300,000 in 1905, $600,000 in 1906, $450,000 in 1907.

Lands, 9,360 acres, in a compact tract south of the Baltic mine, in Town

54 North, Range 34 West, and Town 54 North, Range 35 West, upwards 5,000 acres being on the mineral belt. Company also holds an option on 2,5 acres of mineral land owned by St. Mary's Canal Mineral Land Co., in t immediate neighborhood of its own holdings. Miscellaneous lands include 4 acres, with nearly 4 miles frontage on Lake Superior, near the mouth of t Graveraet river, 3 miles southwest of the Champion mill, at Freda, sufficie to give sites to three or four new stamp mills. The mineral tract was explore 1907, by 1,535' of diamond drilling, without results.

COPPER RANGE CONSOLIDATED CO. MICHIGA

Office: 82 Devonshire St., Boston, Mass. Mine office: Painesdale, Hou ton Co., Mich. Wm. A. Paine, president; Chas. H. Paine, vice-president; Fr eric Stanwood, secretary and treasurer; preceding officers, J. Henry Brook Kenneth K. McLaren, R. Townsend McKeever, Frank McM. Stanton, F. V Denton and Samuel L. Smith, directors; John M. Wagner, purchasing agen C. E. Cleaves, mechanical engineer.

Organized November, 1901, under laws of New Jersey; capitalizatio increased, 1903, to $38,500,000, and increased, 1907, to $40,000,000, shares $1 par; issued, $38,418,500. Has about 6,000 shareholders. American Trust C Boston, transfer agent; Old Colony Trust Co., Boston, registrar. Dividen have been as follows: $1,536,086 in 1905, $2,300,064 in 1906, $2,304,810 in 19 $1,536,740 in 1908.

The Copper Range Consolidated Co. is a securities holding corporation, assets consisting principally of stock in subsidiary companies, these includ the Copper Range Co., Copper Range Railroad Co., Baltic Mining Co. and T mountain Co., all practically owned outright; a one-half interest in the Cha pion Copper Co., and control of the Globe mine, now under development, separately described, under their respective titles.

Share assets of the Copper Range Consolidated Co. are as follows: 99 shares Copper Range Co.; 99,659 shares Baltic Mining Co.; 99,185 shares mountain Mining Co.; 13,986 shares Copper Range Railroad Co., and $615 bonds of Copper Range Railroad Co. In addition, the company holds, uniss 791 shares of its own stock, in reserve, for exchange for outstanding sha of the Baltic Mining Co. and Copper Range Co.

Company's assets, Jan. 1, 1908, included bills receivable of Cha Copper Co., $579,808.99; bills receivable of Baltic Mining Co., $535,070.23; receivable of Copper Range Railroad Co., $35,082.97. Total assets, Jan. 1, were $41,106,790.73, with a balance of $344,154.24 to credit of profit and

Receipts for 1907 were $4,384,315, and disbursements were $4,128,5 company beginning the year with a cash balance of $194,526.83, and e with a cash balance of $450,339.01. Principal items of 1907 receipts $996,590 dividends from Baltic Mining Co.; $448,645.50 dividends from C Range Co.; $114,906.57 from the Michigan Smelting Co., from advance viously made; $600,000 from United Metals Selling Co., advances on c unsold; $1,150,000 bills payable, representing loans made, and $514,885.42 A. C. Burrage, as balance in full under the Trimountain majority stockho agreement of Aug. 25, 1903, this completing payment of the full amou $854,954.80, as per settlement effected 1907. Disbursements, 1907, inc dividends of $2,304,810; $117,030.06 for miscellaneous expenditures, ma legal expenses in the Burrage litigation, and various advances to the subsid companies, necessitated by the complete collapse of the metal market du the latter part of 1907, these advances being $363,045.72 to the Baltic Mi Co., $513,808.99 to the Champion Copper Co., $546,583.49 to the Trimount Mining Co., and $42,251.57 to the Copper Range Railroad Co. Expenditu also included $41,716.40 for electric construction, and $191,580.92 on the Glo

exploration, total expenditures on the latter, to end of 1907, having 307.20.

the Copper Range Consolidated Co. is merely a securities holding , the option on the Globe mine is held direct, but probably will be later, if the property is taken over. The Globe mine is described

mpany is said to plan a central electric power plant, for the opera- mines and mills of its subsidiary companies, which plant probably ated near the Michigan smelter, at Houghton.

gh its subsidiary corporations the Copper Range Consolidated Co. has e second largest copper producer of the Lake Superior district, and dozen largest producers of the world. Copper Range production tal outputs of the Baltic and Trimountain mines, and one-half of of the Champion mine, other half going to the St. Mary's Mineral a joint owner, with the Copper Range, in the shares of the Champion . The production, 1907, of the Baltic, Trimountain and Champion 41,385,015 lbs., leaving a net production, for the Copper Range Con- Co., of 33,140,297 lbs. fine copper, comparing with 32,382,983 lbs. in 32,714,859 lbs. in 1905. Production, 1908, was practically unchanged. and mills are in condition to increase production materially, in the e. Average cost of copper produced, 1907, by the subsidiary compa- bout 9 cents per pound.

probable that the Baltic, Trimountain and Champion mines carry er, and eventually will produce more copper, than the Calumet & e proper, and it should be produced at nearly as great a profit per he management of the Copper Range Consolidated Co. is one of the ressive and efficient in the industry, and its mines are among the very e Lake Superior district.

RANGE & ARIZONA MINING CO. **ARIZONA.**

: 44 Pine St., New York, N. Y. Mine office: Tucson, Pima Co., Ariz. . Hartman, president; Frank G. Wright, secretary; Geo. Saville, Jos. W. Coffin, consulting engineer. Organized under laws of Arizona, talization $1,000,000, shares $2 par. Lands, 15 claims, 5 patented, acres, also 100 acres of millsites and water rights, 40 miles from a pened to depth of 300', with about 3,000' of workings, showing and argentiferous chalcopyrite and galena.

RANGE MINING CO. **MEXICO.**

; Chicago, Ills. Mine office: Autlán, Jalisco, Mex. Is said to have 50-ton smelting-furnace.

RANGE RAILROAD CO. **MICHIGAN.**

: 82 Devonshire St., Boston, Mass. Operating office: Houghton, Co., Mich. Wm. A. Paine, president; R. Townsend McKeever, vice- , manager, assistant secretary and assistant treasurer; Frederic Stan- retary and treasurer; preceding officers, John H. Rice, P. W. Denton, M. Stanton, Rufus R. Goodell and Samuel L. Smith, directors; C. T. eral superintendent.

ined 1899, under laws of Michigan, with capitalization $5,000,000, 0 par; issued, $4,033,700. Bonds, outstanding, $2,025,000, at 5%. Is to issue bonds to the extent of $20,000 per mile of completed main $15,000 per mile of completed branch lines and sidetracks.

r sheet, Dec. 31, 1907, gave cost of road as $5,678,676.83, and cost of as $735,249.55. Earnings, 1907, were $860,434.84, comparing with in 1905. Operating expenses, 1907, were $602,245.21, with $146,680.12 interest, leaving a surplus of $111,298.51, with total credit balance account, for all years, of $504,859.42.

The railroad has upwards of 100 miles of trackage, the main line, of 60 mi running from Calumet to Mass, connecting with the Keweenaw Central at C met, Duluth, South Shore & Atlantic, Hancock & Calumet and Mineral Range ways at Hancock and Houghton, and the Chicago, Milwaukee & St. Paul railway Mass. The company's principal business is the transportation of copper r and supplies for the subsidiary corporations of the Copper Range Consolida Co., for which purpose the line was built, but, incidentally, a large gene business has been built up, and what was a wilderness at the end of the Ni teenth Century has been developed and populated. The road is in fine phys condition, with well ballasted tracks laid with heavy steel rails, substant bridges and good rolling stock.

The company owns a half interest in a railroad bridge crossing Port Lake, between Houghton and Hancock. An extensive water frontage Portage Lake, in the western part of Houghton, is improved by a two-st stone and brick general office building, shops, roundhouse, warehouses a wharves for merchandise and coal. The coal-wharf is equipped with mode unloading machinery, and has deep water alongside, capable of accommodati the largest freighters plying the great lakes.

COPPER RIDGE MINING & DEVELOPMENT CO. NEW MEXI

Mine office: Magdalena, Socorro Co., N. M. Capitalization, $500,000. La are said to show chalcopyrite and sphalerite.

COPPER RIDGE MINING & MILLING CO. COLORAD

Mine office: Steamboat Springs, Routt Co., Colo. W. H. Dunfield, preside Clinton E. Bivens, vice-president; W. C. Shaw, secretary and treasurer; B Goldsworthy, general manager; preceding officers, Ben Goldsworthy, S. R. M berry and G. W. Bratton, directors. Organized 1907, under laws of Colora with capitalization $300,000, shares $1 par. Lands, 2 claims, known as Democrat and Republican, 5 miles north of Steamboat Springs, carrying fissure vein opened by a shaft of circa 100', showing ore assaying up to copper, 2.5 oz. silver and $10 gold per ton.

COPPER RIVER COPPER CO. ALAS

Letter returned unclaimed from former office, Boston, Mass. Robt. Li president; Dr. C. A. B. Peters, vice-president; Geo. Tomkins, second vice-pr dent; Geo. A. Ackler, secretary; M. V. Little, treasurer. Organized, 1907, un laws of Arizona, with capitalization $10,000,000 shares $1 par. Is said to h 2 groups of claims in Alaska, and is presumed to have some connection the Alaska Amalgamated Copper Co., or to have secured lands from same.

COPPER RIVER MINING CO. ALAS

Office: 1347-25 Broad St., New York, N. Y. F. M. Bradshaw, preside Frank Conrad Helm, secretary and treasurer; preceding officers, Hon. R Gwynne, Jr., and John Q. Denny, directors. A. J. Stewart denies that brother, Hon. W. F. Bay Stewart, ever was a director, though the name given by the secretary, Helm, who is a consummate liar and finished ra Capitalization, $50,000,000. Lands claimed were 128 claims, area 2,360 ac including the Bonanza group, which never was owned by the Copper R Mining Co. Lands, if any, are located about 185 miles inland, by trail, Valdez, Alaska, having "plenty of wood and water, with coal in the vicinit the timber being a sparse growth of spruce and cottonwood, and the being lignite of poor quality. The Copper River Mining Co. is a swindle, its promoters should be in jail. Fully described Vol. IV.

COPPER ROCK GOLD MINING & MILLING CO. COLORADO & WYOMI

Office: 105 North 7th St., St. Louis, Mo. Mine offices: Sunset, Bou Co., Colo., and Encampment, Carbon Co., Wyo. H. Lee Servoss, preside Dan G. Kirshbaum, secretary and manager; John Wessels, superintend

ation $1,500,000, shares $1 par. The Colorado property, 60 acres, in r Loaf district, near Sunset, has a 300′ shaft, showing ores giving good hes in copper, gold and silver. The Wyoming property, 6 claims, 120 own as the Copper Link, has shafts of 50′, 100′ and 285′, showing a ched copper ore, carrying up to $4 gold per ton. Wyoming lands pos-

ROCK & GOLD QUARTZ MINING CO. **ARIZONA.**

. Lands sold to Calumet & Boston Copper Co. Formerly at Bisbee, o., Ariz.

SECURITIES CO. **MONTANA.**

: 42 Broadway, New York, N. Y. F. Augustus Heinze, general man-rganized July, 1905, under laws of Arizona, with capitalization 0, shares $10 par. Apparently is a subsidiary corporation of the pper Co., property being $2,000,000 common stock of La France Cop-ecured in exchange for same amount of common stock of Copper Se-o. Reason for existence of company is not apparent.

SELECTION SYNDICATE, LTD. **AUSTRALIA.**

: Broad Street House, London, E. C., Eng. Organized Aug. 22, 1902, s of Great Britain, with capitalization £15,000, in 14,000 ordinary £1 d 20,000 deferred shares, 1s. par. Property was options on sundry d smelting properties, in New South Wales. Moribund.

SHARE SYNDICATE. **WYOMING.**

: 7 Union Court, Old Broad St., London, E. C., Eng. Walter Broom-retary. Organized Jan. 9, 1906, under laws of Great Britain, with tion £5,000, shares £1 par, as Penn-Wyoming Copper Share Syndicate, name changed, March, 1906, to present title. Was promoted to place the Penn-Wyoming Copper Co. in Great Britain.

SHIELD MINING CO. **NEVADA.**

r returned unclaimed from former office, Salt Lake City, Utah. Mine ntact, Elko Co., Nev. Dr. C. I. Douglas, president; U. U. Hiskey, vice-; J. A. DeValley, secretary and treasurer; preceding officers, C. R d H. M. Shields, directors. Organized, 1907, under laws of Nevada, talization $1,000,000, shares $1 par. Lands, 11 claims, in the Salmon trict, showing ore assaying 3 to 56% copper, with gold and silver

SILVER MONTANA MINING CO. **MONTANA.**

r returned unclaimed from former office and mine, Helena, Lewis & , Mont. Lands, in the Scratch Gravel district, just north of Helena, the Sacajewea Gold & Copper Mining Co., have a 350′ shaft in copper ore. Idle.

STAR MINING CO. **COLORADO.**

. Eugene B. Estes was president, and Edwin Wallace secretary. Was that paid "dividends" while peddling stock. Formerly at Salida, o., Colo.

STAR MINING CO. **UTAH.**

office: Springville, Utah Co., Utah. T. Y. Shepherd, vice-president; tch, secretary and treasurer; T. T. Hatch, superintendent; preceding d Jas. H. Okey, directors. Organized 1908, under laws of Utah, with tion $25,000, shares 2½ cents par.

STATE MINING CO. **MONTANA.**

office: White Sulphur Springs, Meagher Co., Mont. Geo. P. Wells, . Lands, circa 15 miles northeast of White Sulphur Springs, have a ment 100′ shaft, with crosscuts said to show a 12′ vein of ore assaying r and 16% zinc, with small silver and gold values. Has a hoist and talling an air-compressor.

COPPER STATE MINING CO. W

Dead. Formerly at Encampment, Carbon Co., Wyo.

COPPERTOWN MINING & SMELTING CO. CALI

Dead. Formerly at Hornitos, Mariposa Co., Cal. Fully describe

COPPER TRUST, LTD.

Office: 20 Laurence Lane, London, E. C., Eng. Geo. Thompson, Organized Dec. 9, 1905, under laws of Great Britain with capitalizatio shares £1 par. Apparently moribund.

COPPER TRUST MINING CO.

Dead. In 1901 had an office in Plankinton Bank Bldg., Milwau

COPPER & URANIUM MINING CO.

Office: Rexburg, Idaho. Henry Flamm, president; M. H. Jar president; Alfred James, secretary and treasurer; preceding officers a Shail, directors. Lands, in the Hamilton district of Blaine county, Id a 125′ shaft on a 10′ contact vein between limestone and quartzite, sai copper and uranium ores. Plans driving a 600′ tunnel.

COPPER VEIL MINING CO. WASH

Dead. Formerly at Index, Snohomish Co., Wash.

COPPER VENTURE SYNDICATE, LTD.

Dead. Voluntarily liquidated, June, 1905. Formerly had an of St. Helen's Place, London, E. C., Eng.

COPPER WORLD EXTENSION MINING CO. WASH

Office: 503 New Hayden Bldg., Columbus, Ohio. Mine office: Okanogan Co., Wash. Walter A. Boyle, president; Edw. H. Caylor, dent; Alfred F. Carman, secretary and treasurer; R. J. Thomas, superi preceding officers, Samuel Bachtell and Clarence E. Ferree, directors. Jan. 11, 1904, under laws of Washington, with capitalization $1,500,0 $1 par. Lands, 8 claims, area 160 acres, on Palmer Mountain, in the Lake district, showing an ore body, estimated by company to be 10 in width, opened by a 300′ two-compartment shaft, with south crosse 210′ level showing a 17′ vein of chalcopyrite assaying circa 8% cop silver and $1.40 gold per ton. Has a steam plant with 2 hoists, good each, and a 5-drill air-compressor. Plans diamond drilling.

COPPER WORLD GOLD MINING CO. WASH

Office: care of Jerome L. Drumheller, Spokane, Wash. Mine office Okanogan Co., Wash. John Wentworth, superintendent. Lands, sand on the apex of Palmer Mountain, lying between the Copper World and Leadville mines, 4½ miles northeast of Loomis, showing a 10 with pyrite near surface and chalcopyrite at little depth. Has severa shafts and short tunnels, showing ore giving assay values of $10 to $1 in copper, gold and silver.

COPPER WORLD MINING CO. CALI

Dead. Formerly at Manvel, San Bernardino Co., Cal. Describe

COPPER WORLD MINING CO. NORTH CA

Dead. Merged, 1903, in Carolina King Mining Co. Formerly at Person Co., N. C.

COPPER WORLD MINING & SMELTING CO. WASH

Dead. Succeeded by Copper World Gold Mining Co. Formerly a Okanogan Co., Wash. Described Vol. IV.

COPPER ZONE MINING CO. NEW

Dead. Lost lands. Formerly at Watrous, Mora Co., N. M.

SOCIEDAD MINERA COQUIMBANA.

Mine office: La Serena, Coquimbo, Chile. Property includes the Socavon and other mines. Idle for some years.

CONSOLIDATED MINING CO. **MONTANA.**
: Butte, Mont. Mine office: Corbin, Jefferson Co., Mont. J. L. . L. Case, D. M. Armstead, H. K. Welch and M. J. Jenkins, directors. 1908, with capitalization $500,000, shares $5 par. Lands, 4 claims, 1 bond and lease on Alta Hill, adjoining the Boston & Corbin, having nel cutting 3 veins, one showing auriferous and argentiferous copper d average tenor.

MINE. **ALASKA.**
by United Metals Co.

IONTANA COPPER CO. **MONTANA.**
ffice: Corbin, Jefferson Co., Mont. Thos. R. Hinds, Fayette Harring- Bacon, John Hoye and J. A. Zzezek, directors. Organized 1907, with ion $1,000,000, shares $1 par. Is a twin of the Jefferson-Montana nes Co.

IONTANA MINES CO. **MONTANA.**
care of Clarence K. McCornick, vice-president and general manager, City, Utah. Mine office: Corbin, Jefferson Co., Mont. Arthur H. S. dent; C. H. Post, secretary-treasurer; preceding officers, H. A. McCor- . T. King, directors. Organized 1904, under laws of Utah, with capi- $600,000, shares $2 par. Lands, in the vicinity of Corbin, were illed, 1904-5; since idle.

ALPARAISO COPPER MINING CO. **MONTANA.**
office: Corbin, Jefferson Co., Mont. A. G. Grosso, H. J. Dewey, sey, J. P. Daly, Frank W. Richards and G. P. Paul directors. Organ- with capitalization $1,000,000, shares $1 par. Mine, on Big Val- untain, has tunnels of 600′ and 800′, latter with back of about 780′, eins, showing ore assaying 3 to 8% copper, with average assays of r and $3 to $9 gold per ton. Made small ore shipments, circa 1885, er ownership.

ICKES COPPER MINING CO. **MONTANA.**
19 East Broadway, Butte, Mont. Mine office: Corbin, Jefferson Co., s. H. Lane, president; W. C. Dierks, vice-president; Edwin L. Mayo, . L. Meixell, secretary; preceding officers, I. A. Heilbronner, W. F. . Symons and H. A. Sullivan, directors. Organized 1904, with capi- 1,000,000, shares $1 par, apparently as successor of Colorado Mining ent Co. Lands, 2 claims, known as the Hidden Treasure and Copper one-half mile from the Alta, and across Picnic gulch from the e of the Boston & Corbin, supposed to carry the extension of the in. Has a 300′ tunnel and 105′ shaft, crosscut from latter said to vein carrying hanging-wall and footwall paystreaks, assaying 4% silver and 40 cents gold per ton, with occasional assays up to 12% z. silver and 60 cents gold per ton.

RO MINING CO. **BRITISH COLUMBIA.**
332 Lumber Exchange, Seattle, Wash. Mine office: Van Anda, nd, B. C. Alfred Raper, manager. Lands, 3 claims, adjoining the , having a 120′ tunnel. Operated, 1905-1906, the Cornell mine, since da Consolidated Mining Co. Company's present holdings produced, 00 tons of ore.

A MINING CO. **MEXICO.**
ffice: Susqui Grande, Hermosillo, Sonora, Mex. W. S. Morrow, las argentiferous copper ores, with steam power and a 5-stamp mill. idle.

COPPER CO. **VERMONT.**
703-68 William St., New York, N. Y. Organized 1906, under laws k, with capitalization $3,000. Lands supposedly are in Vermont.

GEWERKSCHAFT CORIOLAN. GERMAN

Mine office: Wissen am Sieg, Rheinprovinz, Germany. Has lead, copp cobalt and antimony ores, opened by one shaft. Was a very small producer last accounts.

CORK MINERAL DEVELOPMENT SYNDICATE, LTD. IRELAN

Office: Finsbury Pavement House, London, E. C., Eng. Mine office: Sk bereen, County Cork, Ireland. A. J. M. Brown, secretary. Organized June 1903, under laws of Great Britain, with capitalization £15,000, shares £1 p Property is a 31-year lease of 1,040 acres on Mount Gabriel, from which sm quantities of copper ore and barytes have been produced.

CORNELIA COPPER CO. ARIZON

Office: 610 Wright Bldg., St. Louis, Mo. Mine office: Gila Bend, Maricop Co., Ariz. Geo. H. Augustine, president; H. W. Mann, vice-president; John Boddie, secretary; C. W. Chamberlain, treasurer; preceding officers, E. W. Ha C. E. Neeley, C. A. Bowman, T. G. Ratcliffe, Herman Diel, L. O. Branch, H. Salls, Buck Williams, J. W. Sanders, John Brod and M. E. Chamberlain, direc ors; C. L. Chamberlain, manager; L. T. Reynolds, foreman.

Organized May 14, 1900, under laws of Arizona, with capitalizati $1,000,000, shares $10 par, increased, Feb. 19, 1907, to $3,000,000, shares $10 p on which latter date the Rescue Copper Co., a formerly affiliated corporatio was absorbed.

Lands, 13 claims, partly patented, area 260 acres, showing a wide ore bo with limestone foot and granite hanging, carrying silicious copper oxides a carbonates, mainly latter, estimated by company at 10% average copper ten with gold and silver values, which is excessive, as ores are low in grade, pro ably averaging 2.5 to 3% only in copper tenor. Company estimates 25,000,0 tons of ore in sight, which also is a serious overestimate, though the m unquestionably has a large ore tonnage. Development is by tunnels of 3 and 60', and by shafts of 125' and 225', the 200' level showing a 15' to 20' v of sulphide ore assaying 3 to 15% copper, with small gold and silver valu Mine has a small steam plant. Company claims to be able to deliver ore the crusher for 25 cents per ton, which cost cannot be attained.

In 1906 the company contracted with one "Prof." Fred L. McGahan fo so-called vacuum smelter, planned to operate on principles that will prove s cessful when water runs uphill, and not before. The description of this proc given in Vol. VI of the Copper Handbook, is perhaps the most remarkable pi of literature extant in the technical field. The smelter proving an inglori failure, after costing $30,000, McGahan was arrested, and a nephew of M Gahan's was shot three times, while trying to dismantle the plant. The C nelia Copper Co. sued McGahan for damages, and had him indicted crimina May, 1907, on 3 counts, for obtaining money under false pretenses.

Having lost considerable money through the McGahan fiasco, the comp nothing daunted, turned to another new and untried process, invented by electrician named Anderson, which is claimed to have been in use more less successfully for 4 or 5 years, though specific evidence on this point se lacking.

An Anderson electrolytic reduction plant, built at the mine, is rated 5 tons daily capacity, but the first day's run was 320 lbs. fine copper, and largest run apparently was 600 lbs., or 6% of the estimated capacity. plant is terraced, having three 5-ton leaching tanks, followed by 3 settl tanks and 52 square electrolytic tanks placed in four rows, terraced for cir lation of electrolyte. Anodes are of carbon, and cathodes of the usual t copper plates. Electrodes are spaced about 3" apart, and connected in multi with tanks connected in series. Current density is 100 amperes at 110 v and electrolyte is handled by pump. The ore is crushed to 20-mesh size bef

delivery to the leaching tanks, the charge per tank ranging from 2 to 5 tons, according to assay values in copper. The charges are covered with acid solution for 18 hours, at the end of which time the acid, in theory, is supposed to have dissolved the copper, forming a bluestone solution, which passes from the leaching tanks to settling tanks, where impurities are allowed to settle. The clarified solution flows from the settling tanks, by trough, to the electrolytic tanks. Cathodes are built up to about 80 lbs. weight.

The Anderson process, which is planned to treat silicious oxidized copper ores only, provides for dissolving the soluble copper compounds with hydrofluorsilic acid, filtering the electrolyte and depositing copper by electrolysis, using carbon anodes. According to the theory, the electrolyte, on depositing its copper, regains its hydrogen, thus being regenerated for further use. The inventor claims that the acid does not exhaust or deteriorate more than 10% in a year, which statement remains to be demonstrated, and it is claimed that the hydrofluorsilic acid does not destroy the carbon anodes, as does sulphuric acid. The inventor claims that a small experimental plant, at Webster Grove, near St. Louis, Mo., can produce pure electrolytic copper at a cost not to exceed 4 cents per pound, which is important, if true.

The acid, which the inventor terms hydrofluosilic, is made out of about one-third each sulphuric acid, quartz and fluorspar, with the addition of an ingredient kept secret by the inventor. Acid, as used, is said to be of about 15% strength. The inventor claims that the apparatus at the Cornelia can make a special acid for 8 cents per gallon, and that fluorspar can be obtained at a cost of $25 per ton. The inventor was advertising, October, 1907, for fluorspar to be delivered at Webster Grove, Mo. It was first claimed that the Anderson process could produce copper for less than 3 cents per pound, which figures were increased gradually to about 8 cents per pound, but in October, 1907, the mine was partly closed down, because losing money on 13-cent copper. The practicability of the Anderson electrolytic process remains to be demonstrated, but the inventor is of an entirely different stripe from "Prof." McGahan, and it is certain that his process actually will make copper, the crux of the matter lying in the question of costs.

The officers of the Cornelia are residents of St. Louis and vicinity, of excellent local standing, and perfectly sincere in their operations, but are totally lacking in practical knowledge of the copper business, and prone to overmuch experimentation with new processes.

CORNELL GOLD, SILVER & COPPER MINING CO. **NEW MEXICO.**

Dead. Formerly at Silver City, Grant Co., N. M. Described Vol. VI.

CORNELL MINE. **BRITISH COLUMBIA.**

Held, at last accounts, by Texada Consolidated Mining Co.

CORNELL OPERATING CO. **BRITISH COLUMBIA.**

Dead. Formerly at Van Anda, Texada Island, B. C.

MINA EL CORNETA. **MEXICO.**

Mine office: San Miguel Mezquital, Nieves, Zacatecas, Mex. Henry Winsloff, owner and manager. Presumably idle.

CORNISH COPPER CO.

Office: care of Andrew B. Hardryx, New Haven, Conn. Organized December, 1903, under laws of Connecticut, with capitalization $300,000. Location of lands, if any, unknown. Presumably moribund.

CORNUCOPIA COPPER CO. **OREGON.**

Dead. Formerly at Cornucopia, Grant Co., Ore.

CORNUCOPIA GOLD & COPPER MINING CO. **ARIZONA.**

Dead. Formerly at Cherry, Yavapai Co., Ariz.

CORNWALL COPPER CO.

Office: 1206-71 Broadway, New York, N. Y. Location of lands, if unknown.

CORNWALL MINES. MISSO

Mine office: Cornwall, Madison Co., Mo. Were worked on a small s circa 1860. Ores are greater in variety than in quantity, those found incl cuprite, melaconite, malachite, azurite, chalcocite, covellite, bornite, chal rite, chalcanthite and chrysocolla. Idle many years.

COMPAÑIA CORO CORO DE BOLIVIA. BOLI

Office: Santiago de Chile. Mine office: Coro Coro, La Paz, Bolivia. O ized Apr. 23, 1873, under laws of Bolivia, with capitalization 1,025,000 l ianos. Property is the largest copper mine in Bolivia. Mine, 460 meters is opened on conglomerate strata carrying native copper, with occasional c and chalcocite, and silver, which occurs native with copper, as in the Superior mines, is an important by-product. Has steam power, and has said to have a small smelter, but probably latter is a mill, as product is exp as copper mineral, production ranging 600 to 800 quintals monthly, of b de cobre of about 80% average copper tenor, estimated, by the Bolivian g ment, to cost 7.8 bolivianos per quintal. Production, 1907, estimat 1,750,000 lbs. fine copper. Employs circa 500 men.

CORONA CONSOLIDATED GOLD & COPPER CO. ARIZ

Office: Union Blk., Prescott, Ariz. Mine office: Turkey, Yavapai Co., Geo. H. Schuerman, president and general manager; Jas. I. Gardner, president; Eugene Newman, secretary; N. B. Hazeltine, treasurer; prec officers, J. S. Acker and W. B. Brown, directors; Ambrose Stewart, su tendent. Organized Apr. 9, 1903, under laws of Arizona, with capitali $2,000,000, shares $1 par. Lands, 16 claims, area 320 acres, 8 miles f railroad, first located 1880, showing 5 contact deposits between porphyr schist, of 2' to 6' width, of which 3 are developed by 5 shallow shafts, d 80', and by several tunnels, longest 520', estimated to show 40,000 tons c bonate and sulphide ores, with 6,000 tons blocked out for stoping, rang tenor from 3 to 16% copper, 2 to 12 oz. silver and $5.50 to $60 gold pe Mine shipped a little ore, under previous ownership, some years ago, and mill, circa 1890. Idle for several years.

CORONA COPPER CO. ARIZ

Dead. Formerly at Clifton, Graham Co., Ariz.

CORONA COPPER CO. WISCO

Dead. Lands sold by sheriff, September, 1906, for $1,137. Forme Superior, Douglas Co., Wis. Described Vol. VI.

CORONADO COPPER CO. NEW ME

Letter returned unclaimed from former office, Wichita, Kas. Jo Foster, manager; Henry W. Queen, secretary; H. E. Noah, treasurer. Org circa 1905, under laws of Oklahoma, with capitalization $5,000,000, sha par. Lands, 18 claims, in Union county, New Mexico, 45 miles from a ra having a 65' shaft. Average of 41 assays is said to have given 16% copp

CORONADO GOLD & COPPER MINING CO. ARI

Office and mine: Prescott, Ariz. Chas. P. Myers, president and g manager. Lands, 14 claims, area 285 acres, including the Black Warrior in the Black Hills district, said to show considerable ore. Idle for several and apparently moribund.

CORONADO MINING CO. ARI

Office: 52 Broadway, New York, N. Y. Mine office: Metcalf, Graha Ariz. Wm. B. Thompson, president; J. W. Belches, vice-president; W Palmer, secretary; Henry L. Westlake, general manager; John L. Se

intendent. Organized July 12, 1902, under laws of Maine, with capitaliza- $1,000,000, shares $10 par. Is controlled, through ownership of 51% of by Shannon Copper Co. Lands, 23 claims, area circa 400 acres, adjoin- e Coronado mine of the Arizona Copper Co., carrying what is supposed to extension of the Coronado vein. Development is by several short tunnels allow shafts, with a 2-compartment working shaft on the Garnet claim, g a good body of auriferous and argentiferous chalcopyrite on the 200' The Emerald mine shows a considerable body of sulphide ore, giving e assays of about 9% copper. Property considered promising.

NA GOLD & COPPER CO. NEW MEXICO.

ad. Formerly at Santa Rita, Grant Co., N. M.

VA QUEEN MINING CO. NEW MEXICO.

ice: care of Hon. M. A. Otero, president, Santa Fé, N. M. Mine office: , Lincoln Co., N. M. Thos. M. Du Bois, superintendent. Is under English Lands, in the Red Cloud district, give a considerable surface showing ore, apparently of commercial grade, and copper ore up to 67% in tenor n found. Idle since 1906.

A COMPAÑIA MINERA DE CORPUS CHRISTI. MEXICO.

e office: Matehuala, Catorce, San Luis Potosí, Mex. W. B. A. Dingwall, t and manager. Has auriferous copper and argentiferous silver ores, d by an 1,800' tunnel. Presumably idle.

MINE. MONTANA.

ed by Butte Coalition Mining Co.

AD DE MINAS y FUNDICIONES DE CORRALES. ARGENTINA.

e and works office: Chilecito, Rioja, Argentina. Has auriferous and erous copper ores, with a 12-ton smelter and small gas power plant. mall producer, circa 1903. Presumably idle.

ROCK ISLAND MINING CO. MONTANA.

d. Property sold, 1906, to Butte Coalition Mining Co. Formerly ilver Bow Co., Mont. Described Vol. V.

RANCISCO CORREA.

e and mine: San Fernando, Colchagua, Chile. Has a small g matte, and employed about 100 men circa 1902. Presumably

AN, McKINNEY & CO.

e: Cleveland, Ohio. Mine office: Terrazas, Chihuahua, Mex. son, superintendent. Lands include the San Rafael or $50,000, and formerly included the Concheño gold reene Gold-Silver Co. In August, 1907, planned an Rafael. Firm is strong and experienced, being ndependent iron ore operators of the Lake Superior

ND GOLD & SILVER MINING CO.

e office: Ohio, Gunnison Co., Colo. Victor Ren . Ores carry gold, silver, lead, copper and hly idle.

A COPPER CO., LTD. ALASKA.

d. Liquidated June 27, 1906. Formerly Alaska. d Vol. VI. ; preced-

BROS. MINING CO. Young and

e and mine: Helena, Deer Lodge Co. with capitali- Helena, show gold-copper ores. acres, in 3

LLO COPPER CO. located with

e: care of Martin Costello, Tom gth, 2 showing a of lands unknown, but presu

COTTONWOOD COPPER CO. ARIZO

Dead. Was promoted by the Southwestern Securities Co., of Los Ange Was organized under laws of Arizona, with capitalization $1,000,000, shares par. Lands were 6 claims, near Groom Creek, 6 miles south of Prescott, hav a 100′ tunnel and shallow shafts, said to show 4′ of low-grade auriferous argentiferous copper ore. Company was a strong believer in full-page adverti ments, and was not hampered by regard for the truth in its promotion. F merly at Prescott, Yavapai Co., Ariz.

COW CREEK COPPER MINING CO. WYOMIN

Dead. Formerly at Encampment, Carbon Co., Wyo.

COXHEATH MINE. NOVA SCOTI

Owned by Cape Breton Copper Co., Ltd.

CRADOCK DISTRICT COPPER (BEKKERS KLOOF) SYNDICATE, LTD. CAPE COLON

Office and mine: 28 Market Square, Cradock, Cradock Co., Cape Colo W. L. Williams, secretary. Organized Aug. 13, 1907, under laws of Cape Colo with capitalization £3,500, shares £1 par. Lands, on the Farm Bekkers Klo have several shallow shafts and 4 tunnels, longest apparently 210′, showing o assaying up to 36.08% copper, 52 oz. silver and 2 oz. 2 dwts. gold per long t with occasional cobalt. Has secured good assays from surface ores.

CRAWFORD COPPER CO. WISCONSI

Letter returned unclaimed from former office, 531-A Marquette Bl Chicago, Ills. Mine office: Prairie du Chien, Crawford Co., Wis. John P cock, president and general manager; Chas. Greele, vice-president; W. H. H rington, secretary and treasurer; preceding officers, W. T. Pinkerton, Edw. Martner, Francis A. Harper and G. R. Turley, directors. Organized ci 1907, under laws of Maine, with capitalization $1,000,000, shares $1 p Property is an old mine, on which a little work was done, previous to 18 and on which new shafts were started by present company, old workings ha ing caved in. Has secured ores assaying up to 40% copper. Idle and app ently moribund.

CRAWFORD GOLD MINING CO. ARIZON

Office: Clifton, Graham Co., Ariz. Benj. M. Crawford, manager. H auriferous copper ores and steam power.

CREEDE COPPER MINING CO. WYOMIN

Dead. Formerly at Rawlins, Carbon Co., Wyo.

CRESCENT COPPER CO. COLORAD

Office: Edinboro, Pa. Mine office: Boulder, Boulder Co., Colo. Org ized under laws of Colorado, with capitalization $1,000,000, shares $1 p Claims to have sundry rich copper claims somewhere on the line of the Mo railroad. Not regarded favorably. Presumably idle.

CRESCENT COPPER CO. UTA

Mine office: Park City, Summit Co., Utah. Idle for several years.

CRESCENT COPPER CO. WYOMIN

Dead. Formerly at Encampment, Carbon Co., Wyo. Described Vol.

CRESCENT COPPER MINING CO. ARIZON

Office and mine: Bisbee, Ariz. Carl Clausen, president and general ma ager; W. A. Eckerly, secretary. Organized 1903, under laws of Arizona, w capitalization $2,500,000, shares $2.50 par. Lands, 12 claims, in Tombst Cañon, circa 2 miles northwest of Bisbee, showing oxide and carbonate o and small quantities of chalcocite and iron ore, with quartz gangue, claim to give average assays of 19.1% copper and 41 oz. silver per ton, from a v said to range 8′ to 30′ in width. Idle almost from birth and moribund.

MINES, LTD. **BRITISH COLUMBIA.**
fice: Phoenix, Boundary district, B. C. Edw. Ford Johnson, secre-
a 225′ shaft with one level opened, and asked a $50,000 bonus of
uncil to aid in driving a 3-mile tunnel through the mountain be-
nix and Greenwood. Has an air-compressor. Tunnel project is not
feasible.

L COPPER MINING CO. **NEW MEXICO.**
fice: Taos, Taos Co., N. M. Is said to have an 8′ ore body, opened
nnel, on lands in the South Fork district. Presumably idle.

GOLD & COPPER MINING CO. **IDAHO.**
Beatrice, Neb. Mine office: Hailey, Blaine Co., Idaho. Frank
, secretary; W. G. Page, superintendent. Mine has a 3-compart-
haft, bottom workings showing auriferous and slightly argentif-
pyrite of fair average tenor. Has steam power and a 10-stamp
t last accounts.

SMELTER. **BRITISH COLUMBIA.**
by Britannia Smelting Co., Ltd.

PPER CO. **COLORADO.**
Clay Centre, Kan. Mine office: Lyons, Boulder Co., Colo. Chas.
k, president; C. W. Strong, secretary and treasurer. Organized,
laws of New Mexico, with capitalization $1,000,000, shares $1 par.
laims, 2 miles from Lyons. Idle several years.

NNE MINES. **IRELAND.**
by Ovoca Copper Syndicate, Ltd.

EEK COPPER MINING CO. **AUSTRALIA.**
Merged December, 1906, in the Crowl-Creek-Shuttleton Copper
Formerly at Shuttleton, Mouramba Co., N. S. W., Australia.
ol. VI.

EEK-SHUTTLETON MINING CO. **AUSTRALIA.**
Was organized, 1907, under laws of New South Wales, with capi-
150,000, shares £1 par, as a merger of the Crowl Creek Copper Min-
Shuttleton Copper Mining Co. Lands were 260 acres in the Nyma-
carrying about one mile of the strike of the ore body. The Crowl
had a 680′ main shaft, on a 14′ vein with a 30″ paystreak said to
copper on the 530′ level, with reserves of 15,000 tons of oxidized
upper levels, claimed to average 10% copper. The Shuttleton mine,
he Crowl Creek, was opened to depth of 330′, the bottom level
40′ vein with a 4′ paystreak of chalcopyrite, claimed to average
, which probably was an overestimate. Equipment included steam
ir-compressors, with a concentrator and smelter. Production, 1906,
at 1,000,000 lbs. fine copper. Property was sold, circa January,
London syndicate, for £2,500. Formerly at Shuttleton, Mouramba
V., Australia.

OPPER CO. **ALASKA.**
234 Pioneer Bldg., Seattle, Wash. Mine office: Valdez, Alaska.
ord, president and treasurer; Chas. C. Wheeler, secretary; preced-
C. D. Yendell, Hon. John Lyons, W. H. Yendell, J. R. Young and
g, directors. Organized under laws of Washington, with capitali-
0,000, shares $1 par. Lands, 54 claims, area 1,100 acres, in 3
n Knights Island, Prince William Sound, Alaska, located with
either side. Has several tunnels of 25′ to 100′ length, 2 showing
ployed circa 25 men at last accounts.

CROWN LYELL, LTD. TASMAN

Dead. Dissolved, December, 1902. Formerly at Mt. Lyell, Montagu Tasmania. Described Vol. V.

CROWN LYELL COPPER CO., N. L. TASMAN

Office: 60 Queen St., Melbourne, Australia. Mine office: Mt. Ly Montagu Co., Tasmania. Wm. Madden, manager. Capitalization £250,0 shares 25s. par; issued, 160,000 shares, 20s. 11d. paid in. Lands, 30 acr having a 514′ shaft showing a little medium grade ore, and a tunnel of ci 900′ length. Company planned increasing capitalization to deepen shaft, an in 1908, was endeavoring to sell its property to the Mount Lyell Mining Railway Co., Ltd., for £25,000 cash or 17,000 shares of Mount Lyell Mini & Railway Co., Ltd.

CROWN LYELL MINING CO., N. L. TASMAN

Dead. Succeeded by Crown Lyell Copper Co., N. L. Formerly at M Lyell, Montagu Co., Tasmania.

CROWN POINT COPPER CO. ARIZON

Mine office: Globe, Gila Co., Ariz. Organized circa 1907. Lands, kno as the Grand Staff group, on Lower Pinto Creek, have a 400′ tunnel.

CROWN POINT MINING CO. WASHINGTO

Office: 709 Grant Bldg., Los Angeles, Cal. Lands, in Chelan coun Washington, are asserted to show copper, silver and molybdenum ores. A parently organized to sell stock.

CROWN PRINCESS MINING CO. ARIZON

Dead. Merged circa September, 1908, in Clara Consolidated Gold Copper Mining Co. Formerly at Planet, Yuma Co., Ariz.

CROWN QUEEN MINES CO. ARIZON

Dead. Merged circa September, 1908, in Clara Consolidated Gold Copper Mining Co. Formerly at Planet, Yuma Co., Ariz.

MINA LA CRUZ. MEXIC

Office and mine: Indé, Durango, Mexico. Ernesto Avila, owner. Has 40-ton matting furnace. Presumably idle.

COMPAÑIA MINERA DE LA CRUZ. MEXIC

Dead. Formerly at La Cruz, Centro, Tamaulipas, Mex.

CRYSTALINA COPPER CO. ARIZON

Dead. Formerly at Clifton, Graham Co., Ariz.

CRYSTAL LAKE GOLD & COPPER MINING & SMELTING CO. COLORAD

Office: 915 Barristers' Hall, Pemberton Sq., Boston, Mass. Letter turned unclaimed from former mine office, Lake City, Hinsdale Co., C Philip G. Dawson, president; Kendric P. Crawford, treasurer and general m ager; A. D. Wise, secretary. Capitalization $1,500,000, shares $1 par. Lan 10 claims, 4 on Hotchkiss Mountain, and others in vicinity, showing ores gold, silver, copper and lead. Idle and apparently moribund.

CRYSTAL MINING CO. WASHINGTO

Office: 45 Jamison Blk., Spokane, Wash. Letter returned unclaimed fr former mine office, Bolster, Okanogan Co., Wash. Ores carry gold, silver, l and copper. Had steam power and a small smelter. Idle some years a apparently moribund.

CRYSTAL MOUNTAIN MINING & DRAINAGE CO. COLORAD

Mine office: Crystal, Gunnison Co., Colo. Mine has a tunnel show auriferous and argentiferous copper ore. Had a steam plant. Idle.

C. S. A. BLOCK TEN MINING CO. AUSTRAL

Dead. Organized 1906, and merged, 1907, in C. S. A. Mines, Ltd. F merly at Cobar, Robinson Co., N. S. W., Australia.

INES, LTD. **AUSTRALIA.**
16 O'Connell St., Sydney, Australia. Mine office: Cobar, Robin-
N. S. W., Australia. L. J. Winton, superintendent; F. N. Yarwood,
Dr. Richard Head, chairman. Capitalization increased, 1907, to
ares £1 par. In 1907 absorbed the C. S. A. Block 10 Mining Co.,
adjoining company. Lands, 7 miles from Cobar, known as the Cor-
ish and Australian mine, show a very prominent gossan, underlaid
de sulphide ores. Production is mainly silver-lead carbonates, with
ues increasing at depth. Main shaft, at 472', carried ore assaying
r and 2,393 oz. silver per long ton. Production, 1907, was 3,800
of ore averaging 24% lead, 1 oz. silver and 1 dwt. 6 grains gold
line has shafts of 250' and 481', timbered with ironbark and Oregon
square sets and filling depleted stopes with mullock. Has a good
plant, with new hoist and air-compressor, installed 1907, steam
ng condensers, district being arid. Production, first quarter 1907,
ong tons of ore netting £8,304. Employs 65 men.

ORTH SILVER & LEAD MINING CO. **AUSTRALIA.**
ffice: Cobar, Robinson Co., N. S. W., Australia. Mine is opened to
bout 300'. Idle at last accounts.

MOC MINING CO. **MEXICO.**
508 Germania Bank Bldg., Pittsburg, Pa. Mine office: Ocotlán,
ex. James McKay, president; Frank A. Vickery, vice-president; J.
Kay, treasurer; Oscar A. Rogers, secretary; Guillermo W. Thomp-
l manager. Organized 1904, under laws of West Virginia, with
on $400,000. Lands, 21 hectares, including the Carpintero y Anexas
he camps of Taviche, San José and San Martín, showing auriferous
iferous lead and copper ores. Presumably idle.

MINING CO. **MEXICO.**
care of Harry McIntosh, president, Railway Exchange Bldg., Chi-
Mine office: Ayutla, Autlán, Jalisco, Mex. Wm. H. Lees, vice-presi-
eneral manager; Wm. T. Sheffield, secretary and treasurer; Thos. M.
perintendent. Capitalization, £100,000. Property is the old Cuartas
e Bautista district, area circa 250 acres, also sundry adjoining tim-
Mine is an antigua, worked by the Spaniards, and abandoned,
1745, at depth of 275', on account of water and base ore. There
that the mine caved in, burying 7 men. It is stated that ores left
kings assayed 2,268 oz. silver and 1 oz. gold per ton, which is more
ful, as neither Spaniards nor Mexicans left any considerable quan-
ch ore in any abandoned mine, except from dire necessity. The
of the Cuartas is about 30' in average width, carrying mainly sil-
ld values. Assays from old dumps are claimed to run circa 400 oz.
$30 gold per ton, which either is untrue, or samples were selected
al care.

GRANDE MINING CO., S. A. **MEXICO**
Mexican incorporation of the Pittsburg & Sonora Development Co

A MINERA CUATRO SEÑORES, S. A. **MEXICO.**
Chihuahua, Mex. Mine office: Coyame, Iturbide, Chihuahua,
ds, 74 hectares, leased from Las Vigas Mining Co., said to show
ies, as fissures in sandstone and as contact deposits between sand-
clay-slate, ore occurring mainly as impregnations and replacements
lstone. Four ore bodies under development are reported to average
idth, and are claimed to give average returns of 7.5% copper and
r per ton, mainly from bornite and chalcopyrite, with occasional
es and native copper. Has shafts of 61', 98', 125' and 179', with

3 short tunnels, estimated to develop 60,000 tons of ore. Has steam po hoist and air-compressor, with an office building, store and 19 dwellings. is hauled 43 miles, to Las Trancas station, by a Buffalo-Pitts traction eng

CUBA COPPER CO. CU

Office: 2401-60 Wall St., New York, N. Y. Mine office: El Cobre, S tiago de Cuba. Benj. B. Lawrence, president; Colgate Hoyt, vice-presid Jas. T. Nelson, secretary and treasurer; Morrison B. Yung, general manag E. H. Emerson, mine superintendent. Organized Jan. 5, 1907, under laws West Virginia, with capitalization $2,000,000, shares $100 par, divided i $1,500,000 non-cumulative 6% preferred and $500,000 common shares, as s cessor of El Cobre Mines. Annual meeting, first Tuesday in March.

El Cobre mines were opened by the Spanish, A. D. 1532, and probab produced the first copper made in America by Europeans, the first produ of the Cuban mines having been used for casting Spanish cannon. T properties were taken over, circa 1832, by a Hispano-English company, o mined being shipped to Swansea for reduction. The custom-house record Santiago are said to show exports of 610,210 tons of ore, valued at $50,186,2 (probably in depreciated Spanish currency) from 1851 to 1869, inclusive, or as shipped assaying from 12.69% upwards, and probably averaging about 1 in copper tenor. During the revolution of 1868, the big Cornish pump w burned, which flooded the mines, and they remained idle until taken ov 1902, by predecessor of present company.

Lands are extensive, lying 8 miles west of Santiago Bay on which t company has wharves. The property shows a mineralized zone of 200′ wid traceable circa 6,500′, carrying 3 parallel veins, intervening rock being ma altered. Ore is primarily chalcopyrite, associated with pyrrhotite, in a quar gangue, the grains of chalcopyrite frequently being coated with covelli Ore bodies occur in lenticular chutes, along fracture planes, in serpentine, t largest lenses being about 30′ in extreme width, with length of 200′, len averaging about 7′ width with occasional widenings to 20′ and even 30′. T oxidized zone is of 50′ to 75′ depth only, succeeded by sulphide ores averagi 5 to 6% in copper tenor, without either gold or silver in important quantiti

The old workings were extensive, including some 40 shafts, of which t 4 deepest were about 1,200′ each, with 17 miles of underground openings, ti bered mainly with mahogany. Some of the old stopes were 20′ to 30′ in wid but, when unwatered, 1903, many of the old workings caved in, and the m was allowed to fill again. During the rainy season the mine makes 500 1,200 gallons per minute of strongly acid water, requiring pumps of compo tion metal, with lead or wood-lined pipes. The pumps have a combin capacity of 5,000 gallons per minute, and water, after forked from the mi is leached over scrap-iron, producing considerable copper precipitate. T old waste dumps contain about 250,000 tons of rejected material, averag circa 2% in copper tenor. Considerable ore has been blocked out in op cuts, this averaging about 4% copper.

El Cobre railroad, 9 miles in length, owned by the company, conne the mine with Santiago Harbor at Punta Sal, equipment consisting of 2 lo motives and 40 cars.

The smelter, of 200 tons rated daily capacity, is at Punta Sal, but is i and apparently has not been in blast for several years. Company emplo circa 450 men, and ore is shipped to Atlantic coast smelters, in the Uni States, ore being mined both from the old workings, and from a new v previously unworked. Ore produced, 1907-1908, is reported by company as 6.5% average copper tenor. Production, 1907, was 6,483,000 lbs. fine copp

MINING CO. **UTAH.**
ne office: Bingham Canyon, Salt Lake Co., Utah. Has a tunnel, show-
iferous copper ores. Idle several years.

A CONSOLIDATED COPPER CO. **MEXICO.**
ce: care of R. M. Fitzgerald, 16-309 Montgomery St., San Francisco,
ine office: Arizpe, Sonora, Mex. Don Ray, president; A. H. Rose,
ident; M. A. Nurse, secretary; Geo. H. McLean, superintendent. Organ-
. 6, 1903, under laws of Arizona, with capitalization $500,000, shares
Lands, 244 hectares, bought for $20,000, showing 6 ore bodies, of 4'
idth, of which 3, carrying estimated values of 12% copper, 10 oz.
d $2 gold per ton, are opened by 6 shafts, deepest 102', and by a
f tunnels, longest 250' and 575', with a total of 1,415' of underground
. Mine is about 40 miles from La Cananea, the nearest railroad point,
onnected therewith by a good wagon road. Sample carload smelter
s returned 23% copper, with fair gold and silver values. Property
d promising. Presumably idle.

ÑIA MINERA CUBAÑA DEL BRILLADOR. **CHILE.**
e: Valparaiso, Chile. Mine office: Compañía, Coquimbo, Chile. Or
Oct. 20, 1906, under laws of Chile, with capitalization 320,000 pesos,
) pesos par.

EXPLORATION CO. **CUBA.**
e: 11 Nassau St., New York. Letter returned unclaimed from former
ce, El Caney, Santiago, Cuba. W. A. Dennis, vice-president and gen-
ager. Did a little exploratory work, circa 1904. Apparently moribund.

LAND & DEVELOPMENT CO., LTD. **CUBA.**
e: Dashwood House, London, E. C., Eng. Cuban office: Bahia Honda,
l Rio, Cuba. W. R. Beit, agent. Organized Oct. 26, 1905, as suc-
Cuban Mining & Development Co., Ltd. Property is the Finca Naza-
plantation on which present company is centering its operations, also
es of mineral territory in vicinity of Bahia Honda, and two gold
a the province of Santa Clara. The copper mines have 5 old shafts,
rkings of considerable extent, but in very bad condition. Company
mining operations in the near future.

MINING & DEVELOPMENT CO., LTD. **CUBA.**
d. Reorganized Oct. 26, 1905, as Cuban Land & Development Co., Ltd.
at Bahia Honda, Pinar del Rio, Cuba. Described Vol. IV.

ÑIA MINERA CUCHARA. **MEXICO.**
e office: Culiacán, Sinaloa, Mex. Lands show argentiferous and
s copper and lead ores. Presumably idle.

RAS MINING CO. **MEXICO.**
e office: Acaponeta, Tepic, Mex. J. M. Winston, manager, at last
. Operates the San Juan copper mine, opened by shaft and tunnel.
m power and a 40-ton smelter. Production, 1903, was 200,618 lbs. fine
Presumably idle.

LA CUEVA y PEDRO ESTEBAN. **MEXICO.**
e office: Mazapil, Zacatecas, Mex. J. S. Morrison Estate, owner;
R. Orozco, manager. Has highly argentiferous and auriferous copper
when working makes a small amount of copper as a by-product. Has
smelter. Presumably idle.

ULEBRA. **MEXICO.**
e office: Etzatlán, Ahualulco, Jalisco, Mex. T. C. & H. K. Myers,
Mine is an antigua, developed by several hundred feet of shafts
nels, showing auriferous and argentiferous copper sulphides, in a vein
3 metres width. Idle.

adit of the Cactus mine. Ores are chiefly silver-lead, and property is said have good ore on the 300′ level.

CUPRITE COPPER CO. ALASK

Mine office: Sulzer, Prince of Wales Island, Alaska. Lands, lying nort east of the Jumbo group of the Alaska Industrial Co., show a contact vein b tween granite and limestone, carrying chalcopyrite, opened by a 100′ tunnel.

CUPRITE COPPER CO. ARIZON

Office: Columbus, Ohio. Mine Office: Clifton, Graham Co., Ariz. N. Lord, president; Isaac N. Stevens, vice-president; L. B. Kauffman, secretar Geo. B. Kauffman, treasurer; F. C. Alsdorf, superintendent; Frank A. Ra engineer; preceding officers and Frank B. Laine, directors. Organized Mar 1904, under laws of Arizona, with capitalization $1,000,000, shares $1 par.

Lands, 26 claims, area 490 acres, in the Copper Mountain district, open by shafts of 30′ and 320′ and by tunnels of 150′ and 260′, showing ore bod of 5′ to 100′ width. Work performed has been done in the leached zone, whi carries isolated pockets of rich ore, from which sundry small shipments ha given returns of 15 to 30% copper, and up to $5 gold per ton. Company a owns about 2,000 linear feet of strong hematitic outcrops, ranging 5′ to 1 in width. It is likely that the copper veins, which are parallel with a similar to the Big Coronado vein of the Arizona Copper Co., are leached very considerable depths, but prospects for developing large and profita bodies of low and medium grade sulphides at depth seem good. Property c sidered promising. Presumably idle.

CUPRITE COPPER CO. ARIZON

Dead. Formerly at Vail, Pima Co., Ariz.

CUPRITE COPPER MINING CO. NEVA

Letter returned unclaimed from former office and mine, 42 Nixon Bl Goldfield, Esmeralda Co., Nev. G. S. Johnson, president; Oliver Mathe vice-president; Herbert S. Cook, treasurer; Ellsworth Oldt, managing direct preceding officers and S. E. Vermilyea, directors. Organized Dec. 28, 1 with capitalization $1,000,000, shares $1 par. Lands, 6 claims, 3 fractio area circa 85 acres, in the Cuprite district, about 17 miles south of Goldfi showing argentiferous and auriferous copper ores, assaying 10 to 20% cop and 20 to 100 oz. silver per ton. Planned sinking a 100′ shaft. Idle and parently moribund.

CUPRITE MINING CO. WYOMI

Mine office: Holmes, Albany Co., Wyo. Idle since circa 1904.

CUPRITE MINING & SMELTING CO. ARIZO

Office: Tucson, Ariz. Letter returned unclaimed from former mine of Vail, Pima Co., Ariz. E. N. Fish, president; F. W. Fish, treasurer. Capit zation $1,000,000, shares $1 par. Lands, 8 claims, opened by a 120′ sh with about 500′ of workings, showing sulphide ores between limestone porphyry. Idle and apparently moribund.

CUPRUM MINE. CALIFORN

Office: care of Omara & Co., owners, Tonopah, Nev. Mine office: Neel San Bernardino Co., Cal. Early 1907 shipped 15 tons of ore.

CURLEW MINE. MONTA

Office: care of A. M. Holter, owner, Butte, Mont. Mine office: Vic Ravalli Co., Mont. Thos. Cowan, superintendent. Mine, formerly a sil producer, also shows zinc ores and a vein claimed to be 12′ wide said to sh ore carrying 10% copper, with lead, silver and gold ores, opened 1906.

CUSTER PEAK MINING CO. SOUTH DAKO

Mine office: Deadwood, Lawrence Co., S. D. Property shows copper o slightly developed. Late in 1907 company planned resumption of work.

COMPAÑIA MINERA DE CUTTER COVE. **CHILE.**

Dead. Succeeded May 20, 1906, by Sociedad de Minas de Cobre Cutter cove. Formerly at Cutter Cove, Magallanes, Chile.

SOCIEDAD DE MINAS DE COBRE DE CUTTER COVE. **CHILE.**

Mine office: Cutter Cove, Magallanes, Chile. Organized May 20, 1906, under laws of Chile, as a reconstruction of Compañia Minera de Cutter Cove, with capitalization £400,000, shares £1 par. Lands, 15 pertenencias, showing country rocks of diorite and syenite, with veins of 4 to 6 meters width, carrying chalcopyrite with quartz gangue said to average 6% copper. Has a concentrator with Krupp ball mills, and a small reverberatory furnace.

CUZCO COPPER & SILVER CO., LTD. **PERÚ.**

Office: 62 London Wall, London, E. C., Eng. Edgar Anderson, chairman; Sidney Fawns, consulting engineer; Lionel Perry, mine manager; H. Bacon, secretary. Organized Nov. 28, 1907, under laws of Great Britain, with capitalization £3,000, in 2,925 preferred ordinary shares of £1 par and 2,000 deferred shares of 6d. par. Lands, circa 2,000 acres, in the district of Chumbivilcas, Perú.

CYMRU COPPER CO. **ALASKA.**

Office: 117½ South Tenth St., Tacoma, Wash. Mine office: Baldwin, Prince of Wales Island, Alaska. J. M. Miller, Jr., president; F. P. Hicks, vice-president; Frank D. Nash, secretary and treasurer; J. Cuthbert Welch, manager; A. I. Jones, superintendent. Organized 1905, under laws of Washington, with capitalization $50,000, shares $1 par. Lands, 6 claims, area 100 acres, on Moira Sound, showing 3 lenticular ore bodies, reported by company as of 40′ aggregate width, assaying 6 to 10% copper, 4 to 6 oz. silver and $2 gold per ton, mainly from chalcopyrite, with occasional carbonate ores and native copper. Has a 100′ shaft and a 187′ tunnel, with hoist and 6-drill Laidlaw-Dunn-Gordon air-compressor. Has a 4,000′ ground tram, of 36″ gauge, laid with 20-lb. steel rails, leading to a 1,600-ton ore bunker on tidewater, with a gasoline locomotive. Fire destroyed old machinery plant, which was replaced circa June, 1908.

DACOTAH HEIGHTS LAND CO. **MICHIGAN.**

Office and mine: Houghton, Houghton Co., Mich. Lands are the fractional Southwest ¼ of Section 35, Town 55 North, Range 54 West, lying just west of the Isle Royale, in the western limits of Houghton. Was organized as a land company, to promote a townsite, but has mineral rights to the entire tract, and explored the property, 1908, with a diamond drill.

DACOTAH MINING CO. **MICHIGAN.**

Dead. Lands sold, 1905, to Dacotah Heights Land Co. Formerly at Houghton, Houghton Co., Mich.

DAILEY COPPER MINING & SMELTING CO. **MONTANA.**

Mine office: Wickes, Jefferson Co., Mont. Wm. Dailey, president and general manager. Has developed mainly medium grade ore, with some ore of higher tenor, and was shipping, to the Washoe works, circa May, 1908.

DAIRY FARM MINING CO. **CALIFORNIA.**

Office: 165 Broadway, New York, N. Y. Mine office: Van Trent, Placer Co., Cal. Daniel Guggenheim, president; Corey C. Brayton, manager. Organized circa 1903, under laws of California. Company is controlled, through stock ownership, by American Smelters Securities Co.

Lands, 160 acres, showing a mineralized fractured zone of circa 80′ width, in rhyolite and andesite, having a north and south strike, with dip of 60°, opened by a 500′ shaft. Ore is auriferous copper oxides, becoming lean at depth of circa 500′. Mine, opened 1903, was closed September, 1907, because of inability to complete the San Bruno smelter. Equipment includes a 600-

h. p. electric plant, with a 140-h. p. hoist, good for 1,000′ depth, and a 20-dr air-compressor. Buildings, about 25 in number, include a 20x40′ wood machine-shop, 30x50′ carpenter-shop, 30x20′ smithy, office, store and dwelling

A small concentrator has Chilean mills, and a 100-ton leaching pla treats oxidized ores from the gossan.

Survey has been made for a railroad, from Lincoln to Van Trent. Pro erty is reported to have proven somewhat disappointing, but apparently w closed down by reason of depression in the metal market, and inability to co plete the projected San Bruno smelter, rather than because found worthless, reported, as the mine is in shape to begin considerable production, and prob ably will be heard from in the future.

DAISY BELL COPPER-GOLD MINING CO. MONTANA

Office: Butte, Mont. Mine office: Whitehall, Jefferson Co., Mont. Mal colm Gillis, president. Capitalization $600,000, shares $1 par. Lands, 8 miles from Whitehall, have a 160′ shaft, showing ore assaying up to $350 gold per ton, with fair copper and silver values, and with indications of increasing copper values at depth.

DAISY BELL GOLD & COPPER DEVELOPMENT CO. MONTANA

Dead. Organized circa June, 1906, under laws of Montana, with capitalization $600,000, as successor of Daisy Bell Gold & Copper Mining Co., and was succeeded by Daisy Bell Copper-Gold Mining Co. Formerly at Whitehall, Jefferson Co., Mont.

DAISY BELL GOLD & COPPER MINING CO. MONTANA

Dead. Organized Nov. 22, 1905, under laws of Montana, with capitalization $120,000, shares 20 cents par, as a reorganization of a previous Daisy Bell, and succeeded, circa June, 1906, by Daisy Bell Gold & Copper Development Co. Formerly at Whitehall, Jefferson Co., Mont.

DAKOTA-CALUMET CO. SOUTH DAKOTA

Office: Lima, Ohio. Mine office: Hill City, Pennington Co., S. D. Geo. Edward Reed, vice-president; Henry G. Ellison, treasurer; W. J. Boothe, assistant secretary; A. C. Overpeck, superintendent. Organized 1902, under laws of South Dakota, with capitalization $3,000,000, shares $1 par. Is controlled, through ownership of circa two-thirds of stock issue, by Continental Copper Mining & Smelting Co., which, March, 1907, succeeded the Continental Copper Co.

Lands, 19 claims, patented, including the Lilian group, area 179 acres, and a 20-acre millsite, with total landed holdings of 319 acres. Mine has a 380′ tunnel and a 3-compartment 385′ shaft, also shafts of 40′ and 80′, with a 40-h. p. hoist and 10-drill Sullivan air-compressor. Has 15 buildings, including a 16x50′ wooden machine-shop and a 30x40′ wooden carpenter-shop.

The smelter, of wood on stone foundations, connected with the mine by a 300′ Bleichert aerial tram, has a 150-ton Colorado Iron Works blast-furnace and a 120-h. p. steam plant. Smelter, never in blast, is 4 miles from limestone and 6 miles from a railroad, and was built before the mine was developed. Company employs circa 30 men.

DALTON & LARK MINING & MILLING CO. UTAH.

Mine office: Lark, Salt Lake Co., Utah. Was controlled, through stock ownership, by Bingham Consolidated Mining & Smelting Co. Has shafts of 815′ and 1,150′, also 4 tunnels with electric haulage plant, bottom level being said to show ore averaging 7% copper and 60 oz. silver, which estimate is considered excessive.

DALY COPPER MINING CO. AUSTRA

Mine office: Leighs Creek, South Australia. F. Sutherland, manage last accounts. Has steam power. Presumably idle.

DALY JUDGE MINING CO. **UTAH.**

Office: Salt Lake City, Utah. Mine office: Park City, Summit Co., Utah. Otto Hanke, president; Moylan C. Fox, vice-president; Geo. W. Lambourne, secretary and treasurer; Fredk. P. Burrell, general superintendent. Organized 1901, under laws of Utah. A $300,000 bond issue, at 7%, was retired, 1906.

Lands, 146 claims, area 715 acres, including the Anchor mine, with 3 ore bodies, known as the South, Contact and North veins, the middle or Contact vein, which is the more important, showing a strong outcrop for 3,000'. Property also includes the Bonanza group, slightly developed, but considered promising. Ore values are in lead, silver, zinc, copper and gold, approximately in the order given. The mine has nearly 10 miles of workings, making circa 105 gallons of water per minute, which is sufficient, not only for the use of the company's concentrator, but also to supply the Daly-West, under contract, and there is a lake 2 miles from the mine, affording an alternative water supply. The 3-compartment Anchor shaft, having a powerful hoist operating double-deck cages, is 1,650' deep, connecting, on the 1,200' level, with the 6,000' Anchor tunnel, which has an electric haulage system. The Anchor workings have a large ore tonnage blocked out for stoping, and extraction was begun, 1907, on the 1,500' level.

The concentrator, of 300 tons daily capacity, puts 6 into 1, using the Sherman slimes process.

Production, 1907, was 76,914 tons of ore, costs being $3.03 for mining, 95 cents concentrating, $1.08 marketing, 40 cents prospecting and dead work and 23 cents general expenses. Net earnings, 1906, were $500,015.05, or 51.2% of gross earnings, a remarkably good showing. Quarterly dividends were begun, 1907, but second quarterly dividend was passed on account of depression in the metal market. Property considered valuable and management good.

DALY MINING CO. **MONTANA.**

Office: care of Marcus Daly Estate, Butte, Mont. Letter returned unclaimed from former mine office, Copperopolis, Meagher Co., Mont. Organized 1903, under laws of Arizona, with capitalization $1,000,000, to take over sundry mining properties of the Marcus Daly estate, in Meagher, Silver Bow and Lewis & Clark counties, Montana. Properties in Meagher county are the Copperopolis, Daly, North Pacific, Darling Fraction and others. The Copperopolis mines have 3 shafts, deepest 500', with a good surface equipment, and were small producers of high-grade ore for many years, but have been idle since 1903.

DALY WEST MINING CO. **UTAH.**

Office: 163 South Main St., Salt Lake City, Utah. Mine office: Park City, Summit Co., Utah. Employs circa 250 men. J. Ernest Bamberger, president; H. G. McMillan, vice-president; J. Barnett, secretary; W. S. McCornick, treasurer; preceding officers, W. H. Dickson and S. J. Hagenbarth, directors; Ernest Bamberger, general manager; P. L. Williams, Jr., superintendent; E. L. Talbot, mine superintendent; F. W. Sherman, mill superintendent; F. I. Williams, engineer.

Organized Feb. 14, 1902, under laws of Colorado, with capitalization $3,000,000, shares $20 par. Has paid dividends, to end of 1907, of $5,877,000, largest disbursement, 1903, having been $1,332,000; 1907 dividends were $378,000. Regular quarterly dividends were passed first half of 1908. Company ended 1907 with $305,067.31 cash on hand. Has circa 2,800 shareholders. Corporation Trust Co., New York; North American Trust Co., New York; McCornick & Co., Salt Lake City, registrars. American Loan & Trust Co., Boston; North American Trust Co., New York; McCornick & Co., Salt Lake City, transfer agents.

Lands, 50 claims, patented, area 250 acres, in the Uintah district, showing extensive ore bodies carrying argentiferous and auriferous chalcopyrite, galena and sphalerite, with silicious gangue, values being mainly in silver and lead, with small copper values and still smaller gold values. Lead ores apparently are declining in value. Ore production is about equally divided between smelting and concentrating grades. The property has 3 principal veins, of 4' to 6' minimum, and up to 40' maximum width, and additional ore bodies have been developed, to some extent.

The main shaft is 1,640' deep, though no mining is in progress below the 1,400' level, and the mine has about 12 miles of workings, 4,269' having been opened in 1907. The Ontario drain tunnel, about 3 miles long, has been extended into the Daly West property, at the expense of this company, which pays therefor $750 monthly rental. The tunnel in October, 1908, was 155' in Daly West ground, and was expected to connect, circa April, 1909, with the shaft, at a depth of about 2,000'.

The Quincy mine, operated in connection with the Daly West mine, and owned by the company, shows considerable ore reserves, and, in 1907, produced 3,199 tons of first class ore and 7,953 tons of second class ore.

The 350-ton concentrator has crushers, rolls, automatic sorting belt, two 5' Huntington mills and Wilfley tables, putting about 6 tons into 1, with an average extraction of 98% lead and 70.5% silver, the practice being exceptionally advanced and successful.

The tailings mill, 56x82' in size, 400' northeast of the concentrator, has a 5' Huntington regrinding mill, two 2-compartment jigs, 6 concentrating tables, 1 Wilfley table and 7 slime, settling and classifying tanks, treating tailings at a cost of circa 20 cents per ton, when in operation. Water supply for both mills is secured, under contract, from the Daly-Judge mine.

Operations were suspended, late 1907, and resumed circa June 1, 1908. Maximum production, 1903, was 3,160,824 lbs. fine copper, 35,744,000 lbs. lead, 4,382,222 oz. silver and 3,195 oz. gold. Production, 1906, was 830,307 lbs. fine copper, 12,150,000 lbs. lead, 1,200,857 oz. silver and 1,016 oz. gold, and 1907, was 673,890 lbs. fine copper, 8,086,000 lbs. lead, 1,042,062 oz. silver and 949 oz. gold, of the gross value of $771,679.44.

Former large reserves of high grade ore were greatly depleted by undue crowding for several years, culminating in 1903, and the principal reliance for the future is upon large bodies of low grade ore, and some newly opened high grade ore. The mine has about 3 years' supply of milling ore blocked out. Management, since 1904, has been improved, though shareholders remain dissatisfied, and the property is valuable.

DAMARALAND COPPER SYNDICATE, LTD. — **GERMAN SOUTHWEST AFRICA.**

Dead. Voluntarily liquidated, February, 1903. Formerly at Windhoek, German Southwest Africa.

DANA COPPER CO. — **MICHIGAN.**

Office: 68 Devonshire St., Boston, Mass. Mine office: Phoenix, Keweenaw Co., Mich. C. O. Burbank, secretary and treasurer; preceding officer, John C. Watson and Joseph H. Chandler, directors. Organized April, 1853, under laws of Michigan, with capitalization $500,000, and reorganized with capitalization $1,000,000, shares $25 par. Is controlled, through ownership of 35,450 shares, out of the capitalization of 40,000, by the Calumet & Hecla Mining Co. To Dec. 1, 1871, had levied assessments of circa $68,000.

Lands, 640 acres, being the East ½ of Section 25, Town 58 North, Range 31 West, bounded on the north by the Arnold and on the other three sides by

Central. Mine was opened 1851, and never was a producer, having been since 1857.

ES LEA MINING CO. **CALIFORNIA.**

Office: San Diego, Cal. Mine office: Encinitas, San Diego Co., Cal. W. arland, president; W. H. McKinnon, manager. Lands, 20 claims, 8 miles of Encinitas, with shafts of 100′ and 280′, also a tunnel, showing a 3′ vein dium-grade chalcopyrite, traversing porphyry. Has gasoline power. Idle veral years.

A COPPER MINES. **NATAL.**

ine office: Undweni, Ngutu, Zululand, Natal. Lands, 570 acres, in the district, on government lands, circa 30 miles from Vryheid. Mine has shaft, in a vein of ore of fair grade, of 16′ to 20′ width, traceable by circa 2 miles. Has a small mill and planned beginning production ls the first producing copper mine of Natal, and is a property of consid- romise.

MORA GOLD & COPPER MINING CO. **IDAHO.**

ce: Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. Frank man, manager; Henry Klackers, superintendent. Has a 900′ tunnel, spathic iron ore, said to change to copper assaying up to 14% in tenor, oz. silver and $2 gold per ton.

E COPPER MINING CO., LTD. **HUNGARY.**

e: care of E. D. Tupper, 6 Holborn Viaduct, London, E. C., Eng. d December, 1907, under laws of Great Britain, with capitalization hares £4 par. Lands supposedly are in Hungary.

LE & VIRGINIA COPPER MINING CO. **VIRGINIA.**

l. Merged, 1903, in Carolina King Mining Co. Formerly at Virgilina, Co., Va.

& RICHARDSON. **MEXICO.**

e and mine: Unión de Tula, Autlán, Jalisco, Mex. Lands, 60 per- , 7 miles southwest of Ayutla, showing a fissure vein of 5′ to 10′ width, , carrying argentiferous oxides and carbonates, associated with hema- s a 130′ shaft and 325′ tunnel, with some ore blocked out for stoping.

LL MINING & MILLING CO. **WASHINGTON.**

l. Formerly at Kalama, Cowlitz Co., Wash. Described Vol. VI.

GTON-INDIANA MINING CO. **WASHINGTON.**

e: care of Geo. H. Crawford, secretary, Seattle, Wash. Mine office: on, Snohomish Co., Wash. G. A. C. Rochester, president; Jas. G. vice-president. Organized 1906, under laws of Washington, with ation $1,000,000, shares $1 par. Lands, 2 unpatented claims.

ON COPPER CO. **CALIFORNIA.**

l. Formerly at Daulton, Madera Co., Cal.

HARUM COPPER CO. **TEXAS.**

e: 30 Broad St., New York, N. Y. Mine office: Van Horn, El Paso as. Organized 1901. Lands, in the Diablo Mountains, 12 miles east Horn, showed a 12x40′ pothole, carrying good ore, which was exhausted Idle and apparently moribund.

ON O'SHEA COPPERS, LTD. **TRANSVAAL.**

e: P. O. Box 22, Johannesburg, Transvaal. Mine office: Zoutpans- nsvaal. Organized 1907, under laws of Transvaal, with capitalization shares £1 par, with £12,500 issued to vendors, £5,000 issued for work- al and £2,500 unissued. Lands, 96 claims, on Government Farm Rot- No. 1,450, 96 claims on Government Farm Lilliput No. 1,445, and 96 n Scrutton's Concession, unserveyed government ground, all in the berg district, Transvaal. Property has been slightly prospected.

DAVIS-DALY COPPER CO. MONTANA.

Office: 1611-42 Broadway, New York, N. Y. Mine office: Butte, Silver Bow Co., Mont. It is planned to organize this company, with a capitalization of $10,050,000, shares $10 par, as successor of the Davis-Daly Estates Copper Co., having a similar capitalization, to take over the wreck of the latter. A full description of the disreputable career of the Davis-Daly Estates Copper Co. will be found under the title of the latter-named corporation.

The plan of reorganization provides for turning over the assets, such as they are, of the Davis-Daly Estates Copper Co., to the new corporation, which plans devoting circa $500,000 to the liquidation of the debts of the old company, leaving about $300,000 for working capital. Capital of the new company is to be provided by a practically forced assessment of $2 per share on old stockholders, payable in 50-cent installments Oct. 1 and Dec. 15, 1908, and Feb. 15 and March 15, 1909, old stockholders turning in their shares, in addition to the assessment. Stockholders who refused to furnish more money are said to be entitled to a dividend of 50 cents in liquidation, and it is to be hoped that they get it before it disappears.

It is said that Messrs. Coram, Leonard and Heinze, promoters of the old company, intend, with rare generosity, to donate an additional undivided fourth interest in the Daly Estate, which never was owned originally by the Davis-Daly Estates Copper Co., the present landed "holdings" of that corporation consisting merely of a six-elevenths undivided interest in most of its properties. With the addition of the additional fourth interest this would give the new company an undivided interest of thirty-five forty-fourths in the Daly Estate lands. Just what the other proportions may be seems unknown to the public.

The plan of organization calling for a continuance of the management that foisted the former rotten company on the credulous public, discriminating investors can have no confidence in the new company or in any promises made in its behalf. Once bit, twice shy.

DAVIS-DALY ESTATES COPPER CO. MONTANA.

Office: 1611-42 Broadway, New York, N. Y. Mine office: Butte, Silver Bow Co., Mont. J. A. Coram, president; N. Willis Bumstead, vice-president; preceding officers, F. Augustus Heinze (chairman), H. M. Burton and S. S. Rosenstamm, executive committee; preceding officers, E. L. White, Geo. H. Flint, Geo. Baglin, John MacGinnis, Henry Mueller, M. S. Largey, C. F. W. Dillaway, Chester D. Coram and Chas. R. Leonard, directors; W. J. Freeman, secretary; R. A. Cornachan, treasurer; Albert Frank, general manager; Wm. A. Kidney, superintendent.

Organized May 29, 1906, under laws of Maine, with capitalization $10,050,000, shares $15 par. Has circa 3,500 shareholders. Supposedly is controlled, through stock ownership, by United Copper Co. Controls, through stock ownership, the Smokehouse Mining Co., which owns the Detroit, National and Copper Bottom claims. Empire Trust Co., New York, transfer agent; Colonial Trust Co., New York, registrar.

Lands, circa 400 acres, "bought" of the estates of A. J. Davis and Mareus Daly, or rather supposed to have been bought, though apparently the company secured only an undivided interest of six-elevenths in most of its properties this not having been known to shareholders until after the smash. The Davis lands are said to have been bought for $1,393,196, part of which was paid, balance being owned, this also coming out in the wash. Lands include the Owsley ranch and water rights, the mineral lands lying to the south and west of the proven mineral zone of Butte, though very close thereto, stretching over an area of approximately ½ mile wide and 1½ miles long, including old prop-

erties claimed to have yielded profits of $2,000,000, mainly from silver production, these figures apparently being estimates only. Mines were idle from circa 1890 until taken over by present company. Property, in addition to sundry old exploring shafts, has four 3-compartment working shafts, on the Colorado, Smokehouse, Mount Moriah and Silver King claims.

The Mount Moriah has a 640′ shaft, and a crosscut of circa 2,000′ length has been driven to the Mount Moriah claim from the 1,800′ level of the Original mine, this showing occasional stringers of ore and leached veins, apparently there being nothing of workable value developed by the long crosscut, notwithstanding many flourishes of trumpets in the press.

The Colorado mine has a shaft of circa 1,400′ depth, with short crosscuts north and south, showing several veins carrying bunchy values in copper, but heavy in zinc.

The Smokehouse mine consists of one city lot, circa 50x125′ in size, with a 500′ shaft, vein having been lost on the 500′ level. It is planned opening the Smokehouse at greater depth by a crosscut from the Colorado shaft. Equipment, which completely fills the lot, includes a gallows-frame, electric hoist and electric air-compressor.

The Silver King claim, worked, 1907, by lessees, shows considerable good silver ore, with lead and zinc, but is only slightly developed.

The Lizzie mine, about ¼ mile east of the Colorado, has a shaft of about 100′ depth, on the Holy lease, claimed to show a 30′ vein carrying up to 8% copper. This claim was worked, 1907, by lessees, under a 25% royalty, producing some good silver ore.

The Plymouth claim was worked, 1908, in a small way, by lessees.

The only production of the Davis-Daly Estates Copper Co. consisted of ore carrying a little copper and considerable silver, taken out, 1907, by lessees. Work was suspended November, 1907, and resumed, in the Colorado shaft, circa June, 1908. Property has been attached for debts.

Some extremely and apparently deliberately misleading statements have appeared in the press regarding the size and value of the ore bodies of this company. In fact, most of the information appearing in the press has ranged from half-truth to nearly or complete falsehood.

The shares of the company were floated at $12.50 each, and it was stated in the press, apparently in an inspired article, that the actual cost to the promoters was $12.48 per share, leaving to those philanthropic gentlemen the beggarly profit of 2 cents per share, or 16 cents on every $100. In view of the actual facts disclosed upon the company's failure this statement must be considered the prime joke of the season, though it may appear but a scurvy jest to the deluded shareholders who swallowed the bait.

The Davis-Daly Estates Copper Co. was promoted by Messrs. Coram, Leonard and Heinze, Leonard apparently acting as Heinze's agent, the latter remaining in the background. The company was supposed to have begun business with $2,000,000 working capital, but actually started with $500,000 cash, and an agreement that the vendors, J. A. Coram and Chas. R. Leonard, guaranteed by F. Augustus Heinze, would furnish $1,500,000 more when needed. This arrangement was kept sub rosa, but there was a sub-cellar and private trap-door under even this basement arrangement, in the form of an agreement between the company and the vendors of the company, about which the stockholders knew nothing, providing that the vendors were to furnish $2,000,000 cash capital, failing which they could return the stock of the company at $15 per share. The vendors actually provided only $516,401 under this agreement, and met the balance of their "contract" by turning over to the treasury of the company 95,000 shares of stock at $15, at a time when the stock was selling

at about $5 per share, which arrangement effectually choked off what little remained to the company, and rendered the balance of the stock prac worthless. It is obvious that if the stock had been selling at a premiu cash would have been paid. Under this agreement the vendors playe old game, "Heads I win, tails you lose."

In December, 1907, the company was supposed to have had about 2 shares unissued, but a few months later had circa 600,000 shares issued the capitalization of 670,000 shares.

The company's financial statement of September, 1907, gave liabilit only $46,866, which figures were brought out by a juggling of the books comprehensible, but at that time unguessable by any shareholder, henc statement was nothing less than a lie, no matter on what grounds of cas it may be defended. The company's statement of June 30, 1908, show "surplus" of $1,999,000, with liabilities of only about $90,000, while matter of fact the company at that date was bankrupt, and instead of $90,000 of liabilities, the company had a floating debt of that amount owed somewhere between $300,000 and $450,000 remaining unpaid on its The defense of the company, or its promoters, is that this money was not by the company, but by the vendors, but, inasmuch as the property liable to forfeiture by reason of non-payment of these balances, an vendors got out from under by turning back worthless stock to a de treasury, it is evident that the company's financial statements were willfu deliberate lies, and no juggling with words can change this ugly fact.

Payments of about $180,000 were due July 1, 1908, to the owners of but the time was extended.

In the total collapse of this rotten corporation, other facts of prim portance, carefully concealed at the time of flotation, have come to light. only was the alleged $2,000,000 cash capital a myth, and the alleged l holdings held upon part payments, but the company never had any ti claim, no matter how poor, to more than a fractional interest in the land transpired that the Davis-Daly Estates Copper Co. owned, or was suppos own, merely a six-elevenths undivided interest in most of its properties. claimed that the vendors, by an act of rare generosity, will convey to the ganized company an undivided fourth interest in the Daly Estate, whic Davis-Daly Estates Copper Co. never owned. In view of the promises b and the crooked methods employed throughout in the flotation and manag of this company, any shareholder who places any confidence in any stat now made by the vendors writes himself down an ass.

The Davis-Daly Estates Copper Co. being hopelessly bankrupt in cash and reputation, efforts are being made to resuscitate the corpse Davis-Daly Copper Co., and the proposed plan of reorganization is set fo the description of the Davis-Daly Copper Co. Shareholders who failed t the practically enforced assessment on their shares Oct. 1, 1908, are s be entitled to a dividend of 50 cents, in liquidation, presumably supp nobody steals the funeral baked meats.

The Davis-Daly Estates Copper Co. is a swindle, and were justice the people responsible for the frauds would be jailed.

DAVIS MINING & SMELTING CO. **CALIFO**

Dead. Formerly at Halleck, San Bernardino Co., Cal.

DAWES RANGE COPPER & GOLD MINING CO. OF QUEENSLAND, N. L. **AUSTR**

Offices: 78 Queen St., Melbourne, Australia, and 76 Bishopsgate St., don, E. C., Eng. Mine office: Glassford Creek, Queensland, Australia. Henry Foster, J. P., chairman; John Brown, manager; Stobbs & Roscoe, B

agents. Organized January, 1900, under laws of Victoria, with capitalization £300,000, shares £1 par; issued, £250,000. Lands, 240 acres, in the Gladstone district of Queensland. Idle several years, owing to lack of funds.

DAY DREAM & BRETONARTE COPPER MINING CO. **AUSTRALIA.**

Mine office: Leighs Creek, South Australia. F. M. Montague, manager, at last accounts. Has steam power. Idle and apparently moribund.

DEADWOOD GOLD & COPPER MINES CO. **SOUTH DAKOTA.**

Dead. Formerly at Deadwood, Lawrence Co., S. D.

DEATH VALLEY COPPER GLANCE MINING CO. **CALIFORNIA.**

Office: 407-346 Fourth Ave., Pittsburg, Pa. Mine office: Greenwater, Inyo Co., Cal. Capitalization $1,000,000, shares $1 par. Claimed, early 1907, to have nearly $15,000 in treasury for development purposes, but it cannot be found that any work has been done. Lands, 6 claims, known as the Poorman group. Idle.

DEATH VALLEY COPPER MINES & SMELTING CO. **CALIFORNIA.**

Mine office: Greenwater, Inyo Co., Cal. Jerry Rourke, manager. Lands are said to comprise several hundred acres, prospected by numerous pits and shallow shafts. Employed about 50 men in spring of 1907.

DeBORGIA COPPER MINING CO. **MONTANA.**

Office: Ritzville, Wash. Mine office: DeBorgia, Missoula Co., Mont. Wm. Weiland, president; C. H. Clodius, treasurer; W. Greenough, superintendent. Lands, on Goat Mountain, just east of the Idaho line, have a 265′ tunnel, showing a 6′ fissure vein carrying cuprite, melaconite and bornite, with quartz gangue.

DECATUR COPPER MINING CO. **ARIZONA.**

Office: 503 North Main St., Decatur, Ills. Mine office: Jerome, Yavapai Co., Ariz. W. J. Wayne, president; Frank P. Wills, vice-president and treasurer; Geo. R. Bacon, secretary. Organized 1907, under laws of Arizona, with capitalization $2,000,000, shares $1 par. Lands, 10 claims, area 180 acres, also a 10-acre millsite and 10-acre smelter site, 2 miles south of Jerome, in the Verde district, claimed to show 10 fissure veins and lenses, of which 4, slightly developed, are claimed to have an average width of 4′, giving average assays of 5 to 8% copper, 20 oz. silver and $10 gold per ton, which is too high. Has 6 shafts, deepest 280′, and tunnels of 70′ and 150′. Idle since circa 1904, and out of cash, with poor prospects of ever obtaining any.

DEDHAM COPPER MINING CO. **WISCONSIN.**

Office and mine: West Superior, Douglas Co., Wis. Abram G. Ross, president; Wm. C. Burke, secretary. Organized November, 1902, under laws of Wisconsin, with capitalization $1,300,000, shares $25 par; debentures, $150,000 authorized at 6%. Lands, 320 acres, also a 12-acre millsite, with waterfall estimated at 2,400 h. p. available. Has 34 pits and a shallow shaft, showing 3 cupriferous amygdaloid beds, each claimed to average 90′ width and to be about one-third mineralized. Idle for several years and apparently moribund.

DEEMS MINING CO. **UTAH.**

Office: Salt Lake City, Utah. Letter returned unclaimed from former mine office, Bingham Canyon, Salt Lake Co., Utah. C. D. Rooklidge, president; Abram Hanauer, Jr., secretary and treasurer. Organized 1904, with capitalization $75,000, shares 25 cents par. Idle and apparently moribund.

DEEP RIVER GOLD MINING CO. **NORTH CAROLINA.**

Mine office: High Point, Guilford Co., N. C. W. G. Gaither, manager, at last accounts. Mine, opened many years ago, has auriferous and argentiferous copper ores. Idle for several years.

DEER CREEK DEVELOPMENT CO. **UTAH.**

Mine office: American Fork, Utah Co., Utah. John Cleghorn, president;

Henry Johnson, secretary. Organized, 1903, with capitalization $125,000, share 25 cents par. Lands, 7 claims, in the Deer Creek district, showing a fissure ve in granite of 3′ to 6′ width, carrying ores assaying up to 22% copper and oz. silver per ton. Idle for several years.

DEER CREEK GOLD & COPPER MINING CO. WASHINGTO

Dead. Formerly at Silverton, Snohomish Co., Wash.

DEER LODGE CONSOLIDATED MINES, LTD. MONTANA

Office: 16 St. Helen's Place, London, E. C., Eng. Organized July 2, 190 under laws of Great Britain, with capitalization £250,000, shares £1 par, acquire properties, in Deer Lodge county, Montana, said to carry gold, silve lead, zinc, copper, iron, sulphur, tin and coal, some of which minerals, in De Lodge county, apparently are mere figments of the imagination.

SOCIEDAD MINERA DEFENSO y TODOS SANTOS. CHIL

Mine office: Taltal, Antofagasta, Chile. Daniel Olivia, superintendent, last accounts. Has auriferous copper ores, employing circa 40 men.

DEGILBO COPPER MINING SYNDICATE, LTD. AUSTRALI

Dead. Was organized Feb. 18, 1907, with capitalization £960, shares £ par, and was liquidated August, 1907. Former office, Queen St., Brisba Australia.

DE KAAP COPPER MINES, LTD. TRANSVAA

Mine office: Barberton, Middelburg, Transvaal. Capitalization, £2,0 Lands, 158 claims, near Barberton, having a tunnel and a 64′ shaft show small quantities of oxidized ores and copper sulphides.

DE LAMAR'S COPPER REFINING CO. NEW JERSE

Dead. Succeeded, Oct. 15, 1906, by United States Metals Refining Formerly at Chrome, Middlesex Co., N. J. Very fully described Vol. VI.

DE LAMAR-WALL MINING & MILLING CO. UTA

Dead. Sold lands, 1903, to Utah Copper Co. Formerly at Bingham C yon, Salt Lake Co., Utah.

DELAWARE MINE. MICHIGA

Owned by Manitou Mining Co. Very fully described Vol. II.

DELAWARE MINING CO. MICHIGA

Dead. Formerly at Delaware Mine, Keweenaw Co., Mich. Exhaustiv described, under title Oneida, Vol. II.

DEL COBRE CONSOLIDATED MINING CO. ARIZO

Letter returned unclaimed from former mine office, Red Rock, Pinal Ariz. W. Humphrey Read, secretary and treasurer. Organized, 1903, un laws of Delaware. Lands, 15 claims, held under bond and lease, 12 miles of Florence, having a 200′ shaft, showing auriferous and argentiferous co ore. Idle several years and moribund.

DELFINA MINING CO. MEXI

Office: Centro Mercantil 3er, Piso, Mexico, D. F. Mine office: Chi cingo, Bravos, Guerrero, Mex. Paul Merienne, superintendent. Lands inc the Delfina, Argentina and Esperanza mines, carrying argentiferous auriferous copper ores. Has steam power and a 5-stamp mill. Employed c 100 men at last accounts.

DELMAS COPPER CO. NEVA

Office: Salt Lake City, Utah. Mine office: Lee, Elko Co., Nev. J. Wood, president; P. D. Delmas, vice-president and general manager; W. E secretary and treasurer. Lands, in Lee Cañon, 6 miles from a railroad, s contact deposits in wollastonite near granite, also a 30″ fissure vein carry high grade argentiferous ore. Development is by a 170′ tunnel, planned give a back of 800′ at length of 1,400′. Mine is said to show 6′ of ore as

ing up to 14% copper, 211 oz. silver and $9.60 gold per ton. Property considered promising.

DEL NORTE COPPER CO. **ARIZONA.**

Dead. Formerly at Kirtland, Yavapai Co., Ariz.

DEL NORTE COPPER CO. **CALIFORNIA.**

Dead. Formerly at Smith River, Del Norte Co., Cal.

DEL ROY COPPER MINING & SMELTING CO. **NEW MEXICO.**

Dead. Formerly at Alamagordo, Socorro Co., N. M. Was a fraud, promoted from El Paso by Wm. Moeller, W. J. Harris, H. F. Kettler, M. D. Gaylord and others. Sold stock on strength of options to purchase sundry lands. Fully described Vol. VI.

DEL VERDE TUNNEL CO. **UTAH.**

Office and mine: Ogden, Weber Co., Utah. Albert Scowcroft, president; F. L. Woods and Moroni Poulter, vice-presidents; C. H. Hussey, secretary and treasurer; B. F. Critchlow, Willard Scowcroft, F. M. Driggs, W. L. Porter and J. C. Platt, directors. Organized circa January, 1908, with capitalization $200,000, shares 10 cents par, as a merger of Utah Buckhorn Mining Co. and Weber County Mining & Milling Co. Lands, 19 claims, east of Ogden, including the Weber group of 8 claims, and the Buckhorn group of 11 claims in Coldwater Canon. Company is said to plan a one-mile tunnel.

P. P. DEMIDOFF ESTATE. **RUSSIA.**

Mine and works office: Nijni Tagilsk, Perm, Russia. Smelter is known as the Vijski Works. Mine was flooded in 1905, reducing production in that year to 2,962,250 lbs. fine copper, as compared with 4,917,896 lbs. in 1902.

DEMOCRATA CANANEA SONORA COPPER CO. **MEXICO.**

Office: 815 Fourth National Bank Bldg., Cincinnati, Ohio. Mine office: La Cananea, Arizpe, Sonora, Mex. H. H. Hoffman, president, secretary and treasurer; C. E. Hoffman, vice-president and general manager; Adolph Ehlert, mine superintendent; Wm. Harris, smelter superintendent; H. S. McKay, engineer. Organized May 8, 1905, under laws of Arizona, with capitalization $5,000,000, shares $10 par; issued, $2,800,000. Central Trust Co., registrar. Annual meeting, last Tuesday in May.

Lands, 18 hectares, lying in the heart of the Greene Cananea mines, between the Veta Grande and Capote. Development is by an 800′ tunnel, in ore, a 3,000′ crosscut tunnel and a 500′ shaft, latter with collar at bottom of gulch, giving an advantage of circa 800′ in depth, as compared with the neighboring Capote shafts. Property has 2 miles of workings, estimated to show circa 350,000 tons of ore, averaging 6% copper, with combined gold and silver values of about $3 per ton, which estimate probably is too high.

Equipment includes three 80-h. p. hoists, two 120-h. p. hoists and a 15-drill Sullivan air-compressor.

Company owns 15 buildings, including a 20x35′ machine-shop, 15x25′ carpenter shop, assay office, warehouse, general store and several other buildings.

The reduction works include a 125-ton concentrator and a smelter with blast furnaces of 125 tons and 250 tons rated daily capacity, making matte, which is sent to the Greene Cananea works for conversion, when mine is in operation.

Production, 1907, was 3,067,039 lbs. fine copper, 94,434 oz. silver and 271 oz. gold, and company plans increasing capacity to an annual production of circa 10,000,000 lbs. fine copper. Mine considered valuable, though small.

DEMOCRATA MINING CO. **MEXICO.**

Dead. Succeeded, 1905, by Democrata Cananea Sonora Copper Co. Formerly at La Cananea, Arizpe, Sonora, Mex.

DENN-ARIZONA COPPER CO. ARIZO

Office: 600 First National Bank Bldg., Duluth, Minn. Mine office: bee, Cochise Co., Ariz. Martin Pattison, president; A. Guthrie, vice-presid Lemuel C. Shattuck, treasurer; Byron M. Pattison, superintendent; prece officers, Thos. Bardon, Archibald M. Chisholm and Maurice Denn, direct John G. Williams, secretary. Organized Jan. 14, 1907, under laws of Mi sota, with capitalization $3,500,000, shares $10 par, fully issued, as succes of Denn-Arizona Development Co.

Lands, 13 claims, patented, area circa 200 acres, partly owned in fee partly held under bond and lease, final bond payment, $15,000, to Mau Denn, falling due Apr. 4, 1910. Lands are well located, immediately north the Junction shaft of the Superior & Pittsburg. The Dividend fault trave the company's ground for about 1,000′, and big ore bodies have been fou near this fault on other properties. Development is by a 3-compartment 1, shaft, sunk in the conglomerate capping, but penetrating limestone at de of 840′. Mine has circa 5,000′ of workings, on the 1,000′ and 1,100′ levels, sho ing considerable leached ore, but little ore of commercial grade, deposits be very irregular, as in the other Bisbee mines. A 55′ body of leached ore is s to be shown on the 1,100′ level. Company estimates average tenor of o exclusively oxides and carbonates, at 8% copper. The mine has a 1,000-gal triple-expansion Prescott pump on the 1,000′ level, and three 800-gallon si ing pumps. Diamond drilling, 1908, on the 1,100′ level, apparently has giv no important results.

A second shaft was started May, 1906, on the Lee claim. This has temporary hoist and a 6-drill Sullivan air-compressor.

Equipment includes a 1,600-h. p. steam plant, with two 6-drill Sullivan compressors and an 18x36″ Ottumwa Corliss first-motion hoist, raising dou deck cages. Buildings include an 18x24′ carpenter-shop, an 18x24′ smithy several minor structures. There is a railroad spur to the mine.

A little ore was shipped, 1907, but mine was closed, November, 1907, cause of too much water and too little cash. Company plans resuming wo early 1909, on the 1,200′ level. While little ore has been found so far, there excellent indications of good ore bodies at slightly greater depth than reached. Management considered good.

DENN-ARIZONA DEVELOPMENT CO. ARIZON

Dead. Reorganized Jan. 14, 1907, as Denn-Arizona Copper Co. Forme at Bisbee, Cochise Co., Ariz. Fully described Vol. VI.

DENORO MINES, LTD. BRITISH COLUMBI

Dead. Lands sold June, 1906, to British Columbia Copper Co., Ltd. F merly at Eholt, Trail district, B. C. Fully described Vol. VI.

DENVER COPPER MINING & LEASING CO. COLORAD

Mine office: Morrison, Jefferson Co., Colo. Everett B. Curtis, secreta and treasurer. Capitalization, $1,000,000, shares $1 par. Lands, 2 claims, the Cup Creek district, also sundry coal lands. Idle for some years.

DENVER & GLOBE MINING & SMELTING CO. ARIZON

Mine office: Globe, Gila Co., Ariz. Organized Sept. 4, 1906, under la of Arizona, with capitalization $750,000, shares $1 par, by W. J. Mallory, Si H. Coplen and H. G. Stephenson. Lands, known as the Darby group, carryi circa 4,500′ of the strike of a vein with a prominent outcrop, are near t Inspiration and Live Oak mines, in the western part of the Globe district.

DENVER GROUP GOLD & COPPER CO. ARIZON

Office: 319 Douglas Bldg., Los Angeles, Cal. Letter returned unclaim from former mine office, Wickenburg, Maricopa Co., Ariz. Thos. S. Wa worth, president. Capitalization $2,000,000, shares $1 par. Lands, 10 clai

patented, area 194 acres, 12 miles northeast of Wickenburg, showing a mineralized zone of 80′ to 300′ width, traceable 6,000′, showing scattered parallel veins and stringers, opened by 5 prospecting shafts, and tunnels of 225′ and 60′, showing occasional native copper and sulphide ore assaying up to 15% copper and $10 gold per ton. Idle since circa 1904, and presumably moribund.

DENVER & ROCK ISLAND MINING CO. **IDAHO.**

Mine office: Mullan, Shoshone Co., Idaho. Has a shaft of circa 100′ showing ore assaying up to 16% copper, with a $6,000 wagon road from the mine to nearest railroad. Has a saw-mill of about 35,000′ board measure daily capacity.

DERBY COPPER SYNDICATE. **AUSTRALIA.**

Office: Adelaide, South Australia. Mine office: Derby, Western Australia. Lands, fairly timbered and watered, show outcrops of high grade copper ores in a formation of schist and slate. Shipped, 1906, circa 20 tons of 20% copper ore, to Wallaroo & Moonta smelter. Presumably idle.

DERBY SYNDICATE, LTD. **AUSTRALIA.**

Dead. Voluntarily liquidated, July, 1902. Formerly at Derby, Western Australia.

DEROFFSKI MINE. **SIBERIA.**

Mine office: Semipalatinsk, Siberia. Was a small producer at last accounts.

DERWENT PROSPECTING ASSOCIATION. **TASMANIA.**

Mine office: Liena, Tasmania. Lands, 24 miles from Liena, in the Cradle Mountains, include the Derwent, Cradle Mountain and Lake Windermere mines, showing large quantities of low grade ore occurring as stockwerks in Archæan schist. Property is estimated, by Dr. Fritz Noetling, to show 2,000,000 tons of ore on surface, which possibly is the case.

COMPAÑIA MINERA y FUNDIDORA DESCUBRIDORA. **MEXICO.**

Is the Mexican incorporation of the Descubridora Mining & Smelting Co.

DESCUBRIDORA MINING & SMELTING CO. **MEXICO.**

Office: 17 Battery Place, New York, N. Y. Mine office: Conejos, Mapimí, Durango, Mex. R. Brendel, general manager; D. Gough, superintendent. Lands include the Descubridora, an antigua, opened by a 500′ shaft, showing very large quantities of very low grade basic silver-copper carbonates, requiring siliceous ores for flux, latter being bought in the market, as not produced by the company's mines. Has steam and electric power and built, 1902, a 600-ton smelter, but part of equipment was sold later to Continental Copper Co. Property was leased for several years to Guggenheim Exploration Co., but supposedly was turned back to company, early 1908. Production, 1903, was 1,964,272 lbs. fine copper.

SOCIEDAD DESENGAÑO DE PABELLON DE PICA. **CHILE.**

Office: Iquique, Chile. Mine office: Pica, Tarapacá, Chile. Organized May 29, 1906, under laws of Chile, with capitalization £25,000, shares £1 par.

DESERET MINING & REDUCTION CO. **CALIFORNIA.**

Office: 930 South Second West St., Salt Lake City, Utah. Mine office: Leastalk, San Bernardino Co., Cal. Lands, 9 claims, 3 miles from Leastalk, having circa 500′ of workings, said to show auriferous and argentiferous copper ore.

DESERET MOUNTAIN COPPER KING MINING CO. **UTAH.**

Office: care of E. B. McCabe, Salt Lake City, Utah. Letter returned unclaimed from former mine office, Eureka, Juab Co., Utah. Organized circa 1907.

DESERT QUEEN COPPER MINING CO. **ARIZONA.**

Mine office: Quartzite, Yuma Co., Ariz. Organized circa May, 1907, under

laws of Arizona, with capitalization $1,000,000. Lands, 11 claims, in 2 grou opened by crosscut tunnels, intersecting veins at 300′ to 500′ depth, with 6 of drifting on the ore bodies. Has a 40-h. p. gasoline engine, air-compress and power drills. Has been under development since circa 1902. Ores ha given smelter returns of 10% copper, 25 oz. silver and $12 gold per ton.

DE SOTO MINING CO. ARIZON

Office: 1206-71 Broadway, New York, N. Y. Mine office: Middelto Yavapai Co., Ariz. John L. Elliott, president; Cyrus Robinson, vice-presidem Benj. Prince, secretary; preceding officers, Francis Risk, LeRoy T. Harkn and Albert Kerr, directors. Organized January, 1905, under laws of Ne Jersey, with capitalization $100,000, shares $100 par. Bonds, $1,000,000 a thorized, at 6%; issued, $500,000. Is controlled, through ownership of prac cally entire stock issue, by Consolidated Arizona Smelting Co.

Lands, 82 claims, area 1,400 acres, about 40 miles southeast of Presc and circa midway between Crown King and Mayer, in the Peck district, Bra shaw Mountains, carrying 6½ miles of the strike of a very persistent copp formation. Country rocks, of porphyry and quartzite, show 5 parallel veins of 10′ to 60′ width, carrying cuprite, melaconite, malachite, azurite, born and chalcopyrite, with schistose gangue, all having fair values in copper, go and silver.

Development is by 2 tunnels, the Copper Link of 800′, and the Hot Nu ber of 2,400′ length, latter 400′ vertically lower than the former, giving a ba of 1,374′, with a double tram track laid with 20-lb. steel rails. Mine ha nearly 2 miles of workings, showing a large amount of medium grade ore. 4,000′ Bleichert aërial tram, of 2,000 tons rated capacity, connects the mou of the Hot Number tunnel with 2,000-ton ore bins on the railway.

Mining equipment includes two 80-h. p. boilers and a 24-drill Ingers Sergeant air-compressor. There are 9 miles of air and water pipes.

A 160x200′ steel concentrator has 2 Blake crushers, 2 centrifugal crushe 2 sets of rolls, 2 Hancock jigs, 16 vanners, 16 Overstrom tables and 8 size

Production, 1906, was 1,128,327 lbs. fine copper, 19,259 oz. silver and oz. gold; production, 1907, was 1,016,170 lbs. fine copper, 22,216 oz. silver a 933 oz. gold. Property, though low in average grade, has large ore bodi and is considered valuable.

DESPATCH COPPER-GOLD MINING CO. COLORAD

Office: care of R. A. Gurley, secretary and treasurer, Denver, Colo. M office: Morrison, Jefferson Co., Colo. Henry Appel, president; O. M. Decm managing director; Geo. Q. Adams, vice-president and superintendent. Org ized Apr. 12, 1903, with capitalization $150,000, shares 10 cents par. Lan 8 patented claims, adjoining the F. M. & D. Copper Mining Co., circa 10 mi west of Morrison, opened by shafts, showing stringers of ore assaying 9 14% copper. District apparently has not developed continuous ore bodies fair size. Has steam power. Idle.

DESSIE BOYER COPPER-GOLD MINE, LTD. CALIFORN

Dead. Succeeded, circa 1908, by Copper Mines & Smelters Corporat of America. W. C. Fellows, president and general manager; E. H. Kram vice-president; H. M. Bowen, secretary and treasurer. Organized July, 19 under laws of Arizona, with capitalizntion $1,000,000, shares $1 par. F merly at Vontrigger, San Bernardino Co., Cal.

DETROIT & COLORADO MINING CO. COLORAD

Mine office: Silverton, San Juan Co., Colo. L. L. Haines, superinte ent, at last accounts. Has auriferous and argentiferous copper ores, with small steam plant.

DETROIT COPPER MINING CO. OF ARIZONA. **ARIZONA.**

Office: 99 John St., New York, N. Y. Mine and works office: Morenci, Graham Co., Ariz. Employs about 1,000 men. Jas. Douglas, president; Jas. McLean, vice-president; Geo. Notman, secretary and treasurer; Chas. E. Mills, general superintendent; H. H. McLean, mine superintendent; G. E. Hunt, mill superintendent; H. S. Van Gorder, supply and mercantile superintendent; J. B. Fleming, mechanical engineer. Organized under laws of Michigan, with capitalization $1,000,000, shares $25 par. Is operated as a close corporation, by Phelps, Dodge & Co.

Lands are extensive, including the Ryerson, Arizona Central, Copper Mountain, Yankee, West Yankee, Montezuma and Santa Rosa mines, at and near Morenci. Mine, opened circa 1880, originally was worked open-cast, but has been developed latterly by tunnels and shafts, deepest workings being only about 400'. Ores are mainly sulphide, with but trivial gold and silver values, and are highly siliceous, with gangue carrying up to 40% alumina, hence very careful handling is required. About 95% of the production is ore of concentrating grade that gives an average extraction of 35 to 40 lbs. fine copper per ton, ore treated being about half oxidized and half sulphide. A 50' ore-bin at the Ryerson mine is connected with the mill by belt conveyor.

Gas power is used extensively throughout the mines and works, being employed for practically all machinery except hoists and locomotives. A Loomis generator, with capacity to supply gas for developing 1,000 h. p., consumes New Mexico bituminous coal, giving an efficiency of about one horse-power-hour from 1.5 to 1.75 lbs. coal. The power-house, 64x200', of steel frame on concrete foundations, has Crossley gas-engines aggregating 1,920 h. p. This plant includes three 100-h. p. engines driving blowers that are connected with the furnaces by a 300' blast-main; a 500-h. p. air-compressor furnishing converter blast, at 8 lbs. pressure only, and two 200-h. p. 250-volt electric generators furnishing current that is stepped up to 2,500 volts at the power-house, and carried by 4 feed-wires to a second set of transformers at the West Yankee mine, where stepped down to 250 volts, and distributed to the various mines. There also is a complete electric lighting plant.

The 1,200-ton concentrator, having two 600-ton units, is 166x240' in size, and cost about $1,000,000. Equipment includes Chilean mills, 6 sets of 16x42" rolls, 28 revolving screens, 80 Frue vanners and 40 Wilfley tables, the mill putting about 7 tons into 1. A pumping station 6 miles distant raises water from wells on the San Francisco river to a height of 600', whence it is fed by gravity to the mill, which uses about 4,400 gallons per minute, with a consumption of new water of only about 80 gallons per minute, new water being supplemented by clarified water from an ingenious and highly efficient settling system designed by Mr. Hunt that includes tanks and settlers, with a steel dam, and a pond for tailings. Only about 400 gallons of water are used in the concentration of a ton of ore.

The 100-ton sampling mill is connected with the concentrator by a 400' belt-conveyor. Experiments, 1904, with oil concentration, did not lead to the adoption of that process.

The smelter has four 54x144" blast-furnaces, and one 42x264" furnace, and a converter plant was added, 1906. Flue dust is briquetted for resmelting. The smelter has 2,000-ton ore bins, surmounted by steel railroad trestle.

A 36" gauge railway connects the mines and smelters with the Arizona & New Mexico railroad, at Guthrie, this line having a maximum grade of 3.5%, with 4 complete loops within an air-line distance of 1½ miles near Morenci.

The company operates a large department store and an excellent hotel, and maintains a library, gymnasium and clubroom for employes.

Production, 1907, was 17,346,411 lbs. fine copper, 4,814 oz. silver and [illegible] oz. gold, comparing with an output of 16,906,348 lbs. fine copper in 1906. The property is managed with great skill, and is an exceptionally fine example of a successful low grade mine.

DETROIT & LAKE SUPERIOR COPPER CO. CONNECTICUT

Office and works: Waterbury, New Haven Co., Conn. Is a half owner of the stock of the Lake Superior Smelting Co., which bought the plants of the Detroit & Lake Superior Copper Co. at Hancock and Dollar Bay, Houghton Co., Mich. Built a smelter at Detroit, 1850, and shortly after built another at Hancock, being the pioneer in Michigan smelting.

DETROIT-OROVILLE EXPLORATION CO. WASHINGTON

Office: 406 Gladwin Bldg., Detroit, Mich. Mine office: Oroville, Okanogan Co., Wash. F. A. Kelsey, president; Chas. E. Kanter, vice-president; Milton T. Watson, secretary and treasurer. Organized June 1, 1908, under laws of Michigan, with capitalization $3,000, shares $10 par. Lands, 15 claims, area 300 acres, with a smelter site, showing Carboniferous limestone resting on graywacke slates, carrying chalcopyrite giving assays up to 15% copper. Property has been partially explored by diamond drilling.

DETROIT & PARRY SOUND MINING CO., LTD. ONTARIO

Office: 311 Wetherbee Bldg., Detroit, Mich. Mine office: Parry Sound, Parry Sound district, Ont. W. A. Phillips, president; H. C. Morris, vice-president; E. A. Covell, secretary. Organized June 3, 1903, under laws of South Dakota, with capitalization $3,000,000, shares $1 par; issued, at last account, $490,750. Lands have given specimens of ore assaying well in copper. Idle for several years.

DETROIT QUO VADIS COPPER CO. MEXICO

Office: 1001 Majestic Bldg., Detroit, Mich. Mine office. Moctezuma, Bravos, Chihuahua, Mex. Frank C. Houston, secretary; A. C. Simkins, superintendent. Organized 1906, and bought property Aug. 16, 1906. Presumably idle.

DETROIT SONORA MINING CO. MEXICO

Office: care of R. G. Lambrecht, secretary, Detroit, Mich. Letters returned unclaimed from former mine office, La Cananea, Arizpe, Sonora, Mex. M. H. Gilbert, president; F. O. Bostwick, vice-president and general manager. Organized, circa 1906, under laws of Arizona, with capitalization $1,000,000, shares $1 par. Lands, 3 groups, area 214 acres, circa 25 miles from La Cananea, having a 300′ tunnel on the Abigail claim, said to show 200′ of ore of medium grade.

DEVELOPMENT COMPANY OF AMERICA. ARIZONA

Office: 11 Pine St., New York, N. Y. Mine office: Tombstone, Cochise Co., Ariz. E. B. Gage, president; Frank M. Murphy, vice-president; A. C. Gage, secretary and treasurer; W. Dietz, assistant treasurer; W. F. Staunton, general manager; preceding officers, E. C. Gage, W. F. Staunton, Wallace Pierpont and H. M. Robinson, directors. Organized Nov. 23, 1901, under laws of Delaware, and capitalization increased, 1906, to $5,000,000. Is a holding company only, controlling, through stock ownership, the Imperial Copper Co., Tombstone Consolidated Mines Co., Ltd., Congress Consolidated Mines Co., Ltd., Poland Mining Co. and Mexican-American Lumber Co.

DEVINE MINING CO. WASHINGTON

Office: 703 New York Blk., Seattle, Wash. Mine office: Cle Elum, Kittitas Co., Wash. C. P. Devine, president and general manager; F. A. Kittius, vice-president; Henry S. Noon, secretary; Wm. T. Kipp, treasurer; C. M. Lewis, engineer. Organized, 1904, under laws of Washington, with [illegible]

ation $1,000,000, shares $1 par. Annual meeting, second Monday in

Lands, 2 claims, area 40 acres, also two 5-acre millsites and a water right, e Gold Creek district, circa 12 miles north of the Northern Pacific rail- showing andesite and rhyolite with lenticular chutes, of 45′ estimated age width, carrying sulphide ores, reported to average 5% copper, 25 oz. r and $4 gold per ton, with traces of lead and zinc. Apparently values mainly in a 40″ footwall paystreak, balance of vein carrying concentrating of 2.5 to 5% copper tenor, with small gold and silver values. Develop- is by tunnels of 800′, 75′, 300′, 220′ and 125′, with 1,520′ of workings, mated by company to show 100,000 tons of ore, with 50,000 tons blocked out stoping.

VLIN ARIZONA COPPER CO. **ARIZONA.**

Letter returned unclaimed from former mine office, Bouse, Yuma Co., Ariz. ds, 9 claims, known as the Bullion group, 9 miles west of Bouse, said to e been bought for circa $250,000. Property has a number of shallow shafts, of which is said to show, in a crosscut, at depth of 70′, circa 35′ of sulphide claimed to assay 10% copper and $3 gold per ton.

VON UNITED MINES SYNDICATE, LTD. **ENGLAND.**

Office: 6 Pall Mall, London, S. W., Eng. Mine office: Peter Tavy, Devon- , Eng. Edward B. Haynes, chairman; F. N. B. Hill, secretary; Robert , consulting engineer. Organized June 19, 1901, under laws of Great ain, with capitalization £10,000, shares £1 par; issued, £7,797. Debentures, 00, at 6%. Lands, 100 acres, on the river Tavy, carrying tin, copper and enic ores, including the South mine, a tin property, and the Central mine, ter being considered the most promising copper prospect opened in Corn- all for some years. Has a tin-mill with 28 stamps. Presumably idle.

WEY CONSOLIDATED COPPER & GOLD MINING & MILLING CO. **IDAHO.**

Dead. Formerly at Grangeville, Idaho Co., Idaho.

WEY MINING CO. **IDAHO.**

Dead. Formerly at Bear, Washington Co., Idaho.

AMOND MINE. **MONTANA.**

Owned by Anaconda Copper Mining Co.

RNANDO DÍAZ. **MEXICO.**

Office and mine: Túxpam, Santiago Ixcuintla, Tepic, Mex. A. C. González, perintendent. Property is the Cardenillo mine, carrying argentiferous cop- ores. Has steam power and employed circa 50 men at last accounts.

CKERSON MINING CO. **MONTANA.**

Mine office: care of J. W. Dickerson, manager, Basin, Jefferson Co., nt. Mine is slightly developed by tunnel, with steam and water power. several years.

LL GOLD & COPPER MINING CO. **WYOMING.**

Office: Prescott, Wis. Mine office: Rambler, Carbon Co., Wyo. M. T. , president; Geo. S. Hollister, vice-president and treasurer; Edw. H. Wallace, retary. Organized July, 1903, under laws of Wyoming, with capitalization 00,000, shares $1 par. Lands, 4 claims, area 80 acres, next north of the ne, in the Battle Lake district, opened by 100′ tunnel and shafts of 42′ d 100′, with circa 1,000′ of openings, showing several quartz veins carrying or less copper. Has a 40-h. p. boiler, 6x8″ hoist and Cameron sinking Idle for several years.

LLON-ARGENTA MINING CO. **MONTANA.**

Office: Dillon, Mont. Mine office: Argenta, Beaverhead Co., Mont. E.

R. Hall, president. Property has an air-compressor, and was working, Presumably idle.

DILLON CONSOLIDATED MINING & TUNNEL CO. WYOM

Mine office: Dillon, Carbon Co., Wyo. Organized 1904, to drive a tunnel across the formation at Dillon, to cut 6 copper veins, located on face. Idle and tunnel remains an iridescent dream.

DILUVIO GOLD & COPPER MINING CO. ARIZ

Mine office: Bouse, Yuma Co., Ariz. W. D. Tremain, manager. Pro is said to be 5 groups of claims. Presumably idle.

DINGO COPPER MINING CO. AUSTRA

Mine office: Essington, N. S. W., Australia. Produced circa 200 to high-grade hand-picked ore in 1901. Idle some years.

DIRIGO-LA SAL GOLD & COPPER MINING CO. U

Office: care of C. S. Richardson, secretary, Salt Lake City, Utah. office: Castleton, Grand Co., Utah. Geo. E. McCann, manager. Land claims, circa 600 acres, in the Deep Creek district. Presumably idle.

SOCIÉTÉ FRANÇAISE D'ELECTRO-METALLURGIE DE DIVES. FRA

Office: 11 bis, Rue Roquèpine, Paris, France. Works office: France. Plant is an electrolytic refinery, treating Chile bars, having 170-kw. generators, with 216 tanks, electrodes being arranged on the E plan. Capacity is 10 to 12 tons of copper daily.

DIVIDEND MINING & MILLING CO. NEW MEX

Office: 65 Journal Bldg., Boston, Mass. Mine office: Estey, Socorr N. M. J. M. Bryson, president and general manager; J. E. Simpson, president; B. F. Coburn, secretary and treasurer; preceding officers, Street, J. Wm. Rice, Samuel Porter, A. B. Spear, Jas. B. Putnam and Ha E. Parkhurst, directors; W. E. Morong, superintendent. Organized Septe 1902, with capitalization $3,000,000. Has authorized a 5-year bond iss $150,000, at 7%.

Lands, circa 2,000 acres, also sundry coal lands about 16 miles distan is claimed that about $250,000 has been expended on the mine, which sh fair body of sulphide ore, carrying good values in copper, with a little and with small values in gold and silver.

A 100-ton concentrator, apparently since enlarged to 250 tons rated capacity, and a small smelter, were inherited from the Estey Mining & M Co., previous owners, and company is supposed to have begun milling, July, 1907.

The company has been very prolific of "estimates" and promises, onstrating—on paper—how, by merely producing 14,400,000 lbs. of c yearly, profits of millions of dollars could be earned. Company's adver is indefensible, and the statement that "there has been no such opport for investment since the Calumet & Hecla and United Verde were firs on the market" leads to the conclusion that the promoters of the con are sadly lacking either in sense or truth. Property is considered one o promise, but the management is not well regarded.

DIVIDEND MINING & SMELTING CO. MEX

Office: 25 East Ninth St., Kansas City, Mo. Mine office: Suaq Batuc, Ures, Sonora, Mex. Louis Fournie, president; W. E. Flanery, president and mine manager; R. E. Kirtley, secretary; John W. Opie, urer; preceding officers and James Muir, directors. Organized October, under laws of Arizona, with capitalization $2,000,000, shares $1 par. L *195 acres, opened by a 75' shaft and 230' tunnel, showing ores carrying per, lead and silver values, with occasional gold.*

D'JELELE COPPER SYNDICATE. **TRANSVAAL.**

Office and mine: Pietersburg, Zoutpansberg, Transvaal. Organized circa July, 1907, but apparently not incorporated, with capitalization £4,000, shares £10 par. Lands, 96 claims, near the D'Jelele river, in the northeastern part of the Zoutpansberg district, having a 44' shaft showing ore assaying up to 15% copper.

DOANE-VERDE MINING CO. **WYOMING.**

Office: 1301 Monadnock Bldg., Chicago, Ills. Letter returned unclaimed from former mine office, Rambler, Carbon Co., Wyo. John C. Clarke, president; Oliver S. Brown, vice-president; Robert H. Young, general manager. Organized June, 1902, under laws of Wyoming, with capitalization $1,500,000, shares $1 par. Lands, 7 claims, on which a little development work was done, in the hope of striking the extension of the Doane-Rambler ore body, but without results. Idle some years.

DOGAMARU MINE. **JAPAN.**

Mine office: Ago-mura, Ochi-gori, Iwami, Japan. B. Hori, owner; J. Sajaki, general manager. Opened circa 1845, reopened 1873. Ore is chalcopyrite, associated with argentiferous galena, sphalerite and iron pyrites, with quartz gangue. Principal vein, of 10' to 25' width, traverses granite-porphyry, with frequent faults. Has steam and electric power and a small smelter, employing circa 600 hands. Production, 1906, was 445,105 lbs. fine copper and 1,141,482 grams fine silver, and 1907 was 403,505 lbs. fine copper and 258,393 momme fine silver. Owner does not pay his debts.

DOLCOATH MINE, LTD. **ENGLAND.**

Office: 28 St. Swithin's Lane, London, E. C. Eng. Mine office: Camborne, Cornwall, Eng. Frank Harvey, J. P., chairman; Oliver Wethered, vice-chairman; R. Arthur Thomas, mine manager. Organized July 15, 1895, under laws of Great Britain, with capitalization £350,000, shares £1 par; issued, £285,114. Lands include the Dolcoath mine, held on lease expiring June, 1955, under royalty, and the West Dolcoath mine, freehold. The Dolcoath is the principal mine of Cornwall, and is a large producer of tin, securing a little copper as a by-product. Main shaft is nearly ½ mile in depth. Ore in the upper levels is a complex mixture of chalcopyrite, pyrite and other sulphides, all more or less arsenical, carrying 2 to 3% copper and 1 to 2% tin. Complexity of the ore has caused considerable trouble heretofore in the extraction of full values, but a new Elmore vacuum flotation process now saves the copper in the first milling, this formerly having been largely lost, the tin passing over in the tailings and being retreated. Property has a strong and capable management.

DOLGELLY COPPER MINES, LTD. **WALES.**

Office: 11 Coleman St., London, E. C., Eng. Mine office: Dolgelly, Merionethshire, Wales. R. Gillman Brown, technical director; R. Arthur Thomas, consulting engineer. Organized March 7, 1907, under laws of Great Britain, with capitalization £60,000, shares £1 par. Has a large body of ore of low average tenor, ore being complex and difficult of reduction, having yielded, under former milling process, only about 15% of assay values, but a new 120-ton mill, planned as the first unit of a 360-ton mill, using the Elmore vacuum flotation process, similar to that of the Dolcoath, has given test extractions averaging 80.9% of assay values, from complex sulphide ores, very difficult of reduction by any ordinary process.

DOLLY VARDEN COPPER CO. **NEVADA.**

Mine office: Ely, White Pine Co., Nev. Geo. Nix, manager. Organized circa 1907, with capitalization $1,000,000; shares $1 par. Lands are near Curry station, adjoining the Dolly Varden United Copper Co.

DOLLY VARDEN UNITED COPPER CO. NEVADA

Office and mine: care of Frank A. Herrell, president, Ely, White Pin Co., Nev. Organized 1907, with capitalization $1,000,000, shares $1 pa Lands, 9 claims, adjoining the Dolly Varden Copper Co.

MINAS DOLORES y ANEXAS. MEXICO

Owned by Guggenheim Exploration Co.

DOLORES COPPER MINING CO. MEXICO

Dead. Property sold to Guggenheim Exploration Co. Formerly at Mate huala, Catorce, San Luis Potosí, Mex.

DOMINGUEZ COPPER MINING CO. COLORADO

Mine office: Delta, Delta Co., Colo. Lands, sundry claims, known a the Flossie B. group, near Dominguez Cañon. Idle for some years.

DOMINGO MINING, MILLING & SMELTING CO. WASHINGTON

Letter returned unclaimed from former mine office, Republic, Ferry Co Wash. Development is by a 200′ tunnel, on the Little Giant claim, showin ore giving good assays in copper, silver and gold.

DOMINION COPPER CO., LTD. BRITISH COLUMBIA

Office: 37 Wall St., New York, N. Y. Mine office: Phoenix, Boundar district, B. C. Works office: Boundary Falls, Boundary district, B. C. C. Cull, vice-president; Samuel Newhouse, general manager; Maurice M. Johns consulting engineer; P. F. Roosa, mine manager and receiver; John H. Sam son, mine superintendent; John Kawyle, smelter superintendent.

Organized Apr. 26, 1899, under laws of British Columbia, and reorga ized, 1906, with capitalization $5,000,000, shares $10 par. Bonds, $1,000,0 authorized, at 6%, for 10 years, retirable 10% annually; outstanding, $800,0 Acquired, July 28, 1905, upwards of 75% of the capital stock of the Montre & Boston Consolidated Mining & Smelting Co., Ltd., giving one share of sto for two shares of Montreal & Boston, and is supposed to have absorbed pra tically the entire stock issue of the latter named corporation.

Lands, 15 claims, area 500 acres, also fractional interests in 94 clai additional, and a smelter site. Mining lands are in 4 groups, in the Phoen Deadwood, Wellington and Summit camps. Country rocks are limestan and greenstone, ore bodies occurring as contact deposits, and largely as r placements in greenstone. Properties show 8 different veins, all more or le developed, of about 25′ average width, having a generally north and sou strike, with average dip of about 40°. The ores are low in average grad but, though showing large ore bodies, the amount of ground blocked out comparatively small. For fiscal year ending July 31, 1907, the mines mad 8,519′ of new openings.

The Phoenix group, area 366 acres, includes the Brooklyn, Idaho, Ra hide, Stemwinder, Montezuma and Standard mines. The Brooklyn and Idah are adjoining properties, that produced 55,548 tons of ore in 1907, and th Rawhide is about ½ mile distant.

The Brooklyn mine, which is the principal property, has a 430′ mai shaft, with about 8,000′ of workings, showing a 40′ vein, estimated to averag 1.43% copper, 25 cents silver and $1.32 gold per ton.

The Idaho mine, connected with the Brooklyn on the 250′ level, is open by tunnel and shaft, latter having an electric hoist, but is worked mainl open-cast.

The Stemwinder mine, opened on a vein parallel with and about 1,000 east of the Brooklyn, has a 400′ shaft, with about ½ mile of workings, e giving average assays of 1.4% copper, 25 cents silver and $1 gold per ton.

The Rawhide mine, adjoining the Gold Drop mine of the Granby, ha *a 180′ shaft,* 6 tunnels, and various open-cuts, exposing circa 250,000 tons

averaging about 1.4% copper, 25 cents silver and 90 cents gold per ton. Equipment includes a 500' Ingersoll-Sergeant electric air-compressor, and production, 1907, was 64,873 tons of ore.

The Montezuma and Standard claims are but slightly developed, showing ores similar to those of the other mines in the Phoenix camp.

The Deadwood group, area 110 acres, includes the Sunset, Morrison, Crown Silver and C. O. D. mines. The Sunset has shafts of 200' and 412', with large open-cast workings, and shows a large body of ore valuable chiefly for fluxing, carrying excess of iron, silica and lime, with only small copper, silver and gold values. Production, 1907, was 31,258 tons. A trestle from the Sunset mine runs to a 2,000-ton ore-bin on the railroad siding, whence ore is shipped to the smelter. Equipment includes a 14x20" Jenckes duplex link-motion hoist, 14x20" Lidgerwood double-cylinder hoist and a 10-drill Ingersoll-Sergeant duplex air-compressor.

The Crown Silver mine adjoins the Sunset, and is practically a part thereof. Development is by a 265' shaft and an 880' tunnel.

The Morrison mine has a 364' shaft, with 4,300' of tunnels, showing ore averaging circa 0.6% copper, 0.5 oz. silver and up to $4 gold per ton. Equipment includes a 110-h. p. steam plant, with 7x9" hoist and a 5-drill Rand compressor.

The Wellington group includes the Athelstan and Jack Pot mines, with combined area of 34 acres. These show a large outcrop of oxidized ore carrying very low values in copper, about 1 oz. silver and up to $7.50 gold per ton, expected to carry somewhat better copper values below the oxidized zone.

Property in the Summit camp includes a half interest in the Lancashire mine and a three-fourths interest in the Mountain Rose mine, with combined area of 74 acres, carrying fluxing ores. Apparently the Lancashire, which has a silver vein, is idle, but the Mountain Rose, owned one-fourth by the Dominion Mining & Smelting Co., has 2 tunnels, opening a vein of about 15' width, which produced 3,999 tons of fluxing ore in 1907.

Power for the mine and works is mainly electric, current being furnished by the South Kootenay Power Co. from Bonnington Falls, circa 25 miles distant. The Phoenix group has electric hoists and a 25-drill Canadian Rand compressor, driven by a 450-h. p. Canadian Westinghouse electric motor. The largest crusher is a Jenckes-Farrel-Bacon, with 42x30" jaw openings, handling circa 125,000 lbs., with an hourly capacity of 150 tons of ore reduced to 6" size, being one of the largest ever built.

Ore is transported 4 to 25 miles from the various mines to the smelter, Greenwood. The matter of building a 5-mile aërial tram to cost circa $100,000 has been given tentative consideration. Rail freights are 17 cents per ton on Deadwood ore, and 30 cents per ton on ore from the Phoenix and Summit mines.

The smelter, 4 miles from Greenwood, of 1,500 tons rated daily capacity, was built by the Standard Pyritic Co., passing later to the Montreal & Boston, and eventually to the Dominion. The old smelter was not well located, and was poorly equipped, but has been overhauled and modernized by the present owners. Extra land has been secured for slag room.

The works include a small sampling mill, equipped with crushers, rolls, conveyors and Vezin and Bridgeman automatic samplers.

The blast furnace building is 120x182', having in the building sixteen 12' ore bins, with 3 large ore and coke bins outside, with railroad tracks passing above. There are two 225-ton water-jacket blast furnaces, 40x176" at tuyeres, and one 600-ton 44x256" furnace, all having automatic feed. The

dust-flue, 200′ long, has a 30x50′ brick dust-chamber, and leads to a stack high and 9′ 6″ in diameter, and a self-supporting stack 100′ high and 8′ in di eter. Slag is handled by a 7x12″ locomotive, on railroad track of 40″ ga

The power plant at the works includes No. 7 Connersville blowers an 250-light dynamo. The old machinery plant was burned 1908, but was reb The works include a machine-shop.

The smelter works three 8-hour shifts when operated, and product matte carrying about 45% copper, 13 oz. silver and 3 oz. gold per ton, ship to the British Columbia smelter at Greenwood, for refining. The smelter does custom work.

Production for year ending July 31, 1907, was 187,981 tons of ore, yield 2,910,695 lbs. fine copper, 42,606 oz. silver and 10,321 oz. gold, realiz $820,184.84, with total operating expenses of $740,002.72, giving a net min profit of $80,942.91. Company claimed, late 1906, to be making circa 750, lbs. of copper monthly, at a cost of 8 cents per pound. Company's finan statement showed a profit, on operations for 18 months ending July 31, 1 of $139,144. Production for year ending July 31, 1907, averaged 15.5 lbs. copper, 0.5 oz. silver and $1.10 gold per ton. New management is said to s costs of $1.34 per ton for mining, including freight, and $1.32 for smelti or total mining and smelting costs of $2.66 per ton. Allowing 34 cents mis laneous expenses, the cost would be $3 per ton on ore reduced to matte, which should be added 40 to 50 cents per ton for conversion, refining, smelt and miscellaneous expenses, giving total costs of about $3.50 per ton on exclusive of interest on bonded indebtedness. Deducting therefrom $1.40 ton for including gold and silver values, cost of copper contained in a of ore, amounting to 15.5 lbs., would be $2.10, or 13.5 cents per pound, inst of the alleged cost of 8 cents per pound.

The company begun 1907 with a treasury surplus of circa $400,000, w was expended, mainly on improvements at the mine and smelter, the comp suffering also, in common with others, by reason of the slump in the m market. There was some talk of dividends, early 1907, which was entir unwarranted. Mine and works were closed down, circa November, 1907, resumed, circa July 1, 1908.

The company was unable to meet a bond interest payment of $24,000, d June, 1908, but this payment was made by some of the larger shareholde On October 2, 1908, a receiver was appointed, on application of the mortg trustee, by reason of the company's default in not setting aside 10% of amount of its outstanding bond issue, for the sinking fund, as required to done annually. The company is in such shape that reorganization s obligatory. The property is dangerously low in grade, but has enormous bodies, and, with adequate capital and prudent management, should bec a large and profitable producer, in time.

DOMINION FAIRVIEW COPPER CO., LTD. **BRITISH COLUMB**

Office: Terminus Chambers, Holborn Viaduct, London, E. C., Eng. M office: Fairview, Boundary district, B. C. Wm. J. Spratling, secretary. ganized Sept. 22, 1901, as Dominion Fairview Klondike Syndicate, Ltd., name changed to present title March, 1907, with capitalization £130,000, sh £1 par; issued, £42,637. Lands, 4 claims, area 200 acres, circa 4 miles n of the international boundary line, carrying a 6″ vein, opened by shafts 50′ and 55′ and the beginning of a tunnel, showing a little copper ore of assay tenor.

DOMINION MINING & SMELTING CO. **CA**

Works office: Pictou, Pictou Co., N. S. Property is a 70-ton fur *blown in* circa May, 1907, making matte of about 35% copper tenor.

DOMINION SMELTING CO., LTD. **ONTARIO.**

Works office: Parry Sound, Parry Sound district, Ont. Was said, September, 1907, to plan building a $1,500,000 custom smelter, at Parry Sound. Presumably abortive.

MINA DON CARLOS. **MEXICO.**

Office: care of Avery T. Holmes, owner, Laramie, Wyo. Mine office: Moctezari, Sonora, Mex. Main shaft, 120', shows ore running up to 43% copper, and from 60 to 7,000 oz. silver per ton. Shipped several carloads of high-grade ore to the El Paso smelter circa 1905. Presumably idle.

DON CARLOS & EUREKA CONSOLIDATED COPPER MINING CO. **MEXICO.**

Letter returned unclaimed from former office, Detroit, Mich. Mine office: Hombre de Dios, Durango, Mex. Property includes the Don Carlos y Anexa, Eureka and other mines, showing a vein about 150' wide, carrying small stringers and pockets of high-grade auriferous and argentiferous bornite, carrying up to 18% copper, 3 kgs. silver and 7 grams gold per ton. Production, about 75 tons of ore in three years. Idle and apparently moribund.

DON FULANO COPPER MINES, LTD. **SPAIN.**

Office: Dashwood House, London, E. C., Eng. Col. C. E. Macdonald, chairman; C. E. Lawson, mining engineer; A. S. Hammond, secretary. Organized July 7, 1905, under laws of Great Britain, with capitalization £130,000, shares £1 par, fully issued. Property is 60 full paid shares, of 500 pesetas each, in the Compañía Minera Bilbaino Asturiano.

DONA LOUISA CONSOLIDATED COPPER CO. **MEXICO.**

Office: 42 Broadway, New York, N. Y. Mine office: Coapa, Morelia, Michoacán, Mex. Organized circa 1907, to merge the Dona Louisa Copper & Gold Mining Co. and La Natividad Mining Co., latter a rank swindle that paid dividends from stock sales, and former a dubious proposition that also paid dividends from stock sales.

DONA LOUISA COPPER & GOLD MINING CO. **MEXICO.**

Letter returned unclaimed from former office, 69 Wall St., New York, N. Y. Mine office: Coapa, Morelia, Michoacán, Mex. Wm. A. Buckman, president; Chas. M. Heath, vice-president; Manuel L. Ward, secretary, treasurer and general manager; Joseph J. Collinson, superintendent. Organized April, 1905, under laws of Delaware, with capitalization $500,000, shares $5 par. Paid dividends of $4,200 on treasury stock, presumably from stock sales.

Lands, 45 hectares, 24 miles from the Mexican National railway, showing 3 veins, of 3' average width, 2 under development, giving assays of 4 to 6% copper, up to 120 oz. silver and $32 gold per ton, from oxidized ores, chiefly developed by shafts and tunnels.

Equipment includes a 60-h. p. boiler, Lidgerwood hoist good for 1,000' depth, and Cameron pump. A 5-ton test shipment, 1906, netted $59.62 per ton. Development and equipment seem along sensible lines, but the company paid 10% dividends while selling stock, hence is viewed with suspicion. Probably succeeded by Dona Louisa Consolidated Copper Co.

DONNA DORA MINING CO. **NEW MEXICO.**

Office: 220 Broadway, New York. Mine office: Kent, Donna Ana Co., N. M. Jos. Willetts, president; Edwin L. Scott, secretary and treasurer; Harold W. Kent, general manager. Lands, sundry claims on the eastern slope of the Organ Mountains, developed by a 400' tunnel and a shallow shaft, on a vein carrying copper, lead, silver and gold values. Equipment includes a 50-ton concentrator, 100-h. p. hoist, 10-drill Rand air-compressor and a small electric light plant. *Employs about 20 men.*

DORA COPPER MINES, LTD. TRANSVAA

Office: 34 Coleman St., London, E. C., Eng. Mine office: Pretoria, Tra vaal, South Africa. W. Vaughan-Williams, chairman; J. H. Bailey, secreta Organized May 10, 1905, under laws of Great Britain, with capitalizat £150,000, shares £1 par; issued, £100,010. Property is mining rights to northwestern half of the Farm Kamelpoort No. 278, area 4,027 morgen, n Pretoria.

DORAN & GALLAGHER. ARIZON

Office and mine: Paradise, Cochise Co., Ariz. Is a co-partnership co posed of D. J. Doran and Chas. J. Gallagher. Lands, 10 claims, opened by 110′ shaft, mainly in ore, and a 250′ tunnel, showing melaconite giving ass of 10% and upwards in copper.

DOROTEA MINING CO. MEXIC

Dead. Lands sold, circa 1905, to Fay-Cananea Copper Co. Formerly La Cananea, Arizpe, Sonora, Mex.

GEWERKSCHAFT DES BLEI- UND KUPFER-ERZBERGWERKE DOROTHEA. GERMAN

Mine office: Jannowitz, Schlesien, Germany. Herman Schönfelder, agt Has one shaft. Idle several years.

DOS CABEZOS CONSOLIDATED MINES CO. ARIZON

Mine office: Dos Cabezos, Cochise Co., Ariz. Has auriferous and argen iferous copper ores, with steam power and a small smelter. Idle several ye

DOS DE ABRIL MINING CO. MEXIC

Mine office: El Dorado, Jiménez, Chihuahua, Mex. Heffron & Pi lessees. Has auriferous and argentiferous lead and copper ores, with 7-sta mill, employing circa 50 men at last accounts.

DOS ESTRELLAS MINES & DEVELOPMENT CO. MEXI

Office: care of Mutual Trust Co., Mexico, D. F. Hon. Alberto Pro, pr dent; Hon. José Marie Gamboa, vice-president; Hon. Lic. Liscendro Maldona secretary; Geo. W. Emanuel & Co., fiscal agents. Organized under laws Arizona, with capitalization, $2,500,000, shares $1 par. Lands are the Jes mine, a gold-silver property, and the Mina Conquestadora, a copper prope area circa 130 acres, in El Oro district, Guerrero, Mexico, said to be held un lease. Company claims to have a mill and cyanide plant, and claims to ha $2,500,000 worth of ore blocked out. Company claims that these mines p duced $4,000,000 in ore values, in 4 years preceding 1907, and that 1906 p duction was sufficient to pay a dividend of 50% on the capital. Compa claims to be paying 2-cent monthly dividends, guaranteed, and is peddli stock industriously, which leads to the unavoidable conclusion that it is highly dubious enterprise, notwithstanding the good standing of some of officers. No honest mining company pays 24% annually and peddles sto Verbum sapienti.

DOS NACIONES MINING CO. MEXI

Dead. Lands sold to Cananea-Duluth Mining Co. Formerly at La C anea, Arizpe, Sonora, Mex.

DOUBLE SUNSET MINING & MILLING CO. ARIZO

Office: care of A. Stamps, manager, Farrisville, Kas. Mine office: Pa dise, Cochise Co., Ariz.

DOUGLAS COPPER CO. MEXI

Office: 1547-42 Broadway, New York, N. Y. Mine office: Cocorit, Alam Sonora, Mex. Theo. Douglas, president; Victor M. Tyler, vice-president; J. C. Rowe, second vice-president; C. R. Templeton, secretary and assistant tr *urer;* Wm. S. Higgins, treasurer; Melbert B. Cary, chairman; Gustave M. C *yard,* consulting engineer; preceding officers, Max Muller, E. C. Friable, R

trong, A. Heaton Robertson, Ronald E. Curtis and W. Stockton Higrectors; Edwin H. Davidson, superintendent.
anized July 23, 1903, under laws of Maine, with capitalization 00, shares $5 par. Bonds, $900,000 authorized, at 6%; $572,800 outstandwhich $400,000 are convertible into stock, part at par and part at 110. to be controlled, through ownership of 51% of stock, by the Mexican tion & Milling Co. Is a securities holding company only, owning the capital stock of the Anita Copper Mines Co., Ltd., and Pacific Smelting ing Co., Ltd., and controlling, through ownership of majority of stock, horn Consolidated Gold Mines Co., Ltd. Company began 1908, accordstatement, with cash and accounts receivable of $58,793, only liabilities 572,800 on bonds outstanding. Empire Trust Co., New York, registrar. l meeting, third Tuesday in January.
nds, held through subsidiary companies, are 494 acres, a 115-acre mill-d 19,716 acres of ranch, timber and coal lands, in the Baroyeca division Alamos district, including the Anita, Baroyeca, Consolidada, London, a and Maria mines. Ore bodies occur in a crush-zone of 115' claimed e width, in series of bedded eruptives consisting of diorite, andesite achyte, as contact deposits and replacements in diorite, carrying cuprite, nite, malachite, azurite, chalcocite, covellite, bornite, chalcopyrite, ntite and chrysocolla, from which average assays are said to have re-8.5% copper, 5.5 oz. silver and $5 gold per ton, which figures probably siderably above the average extraction that can be secured on regular operations upon a commercial basis.
velopment is by 5 shafts, No. 1, the deepest, being circa 700', with f workings in the Anita mine, Jan. 1, 1907, since increased. Company to have sufficient ore blocked out for 5 years production, which is con-l doubtful, and ore reserves are estimated, by Messrs. Gouyard and tt, to be of the value of $5,817,681.94, with copper at 14 cents per . This sort of estimate is not in favor with the best engineers, who to estimate in tons and percentages, not in dollars, and, especially, not ts. Such estimates, giving the odd pennies, may attract the credulous, considered a danger signal by the experienced.
he mine has steam and electric hoists, with one 250-h. p. Risdon hoist, a cross-compound two-stage air-compressor with piston capacity of 3,700' e air per minute, and an electric light plant. Mine has 21 buildings, ing necessary shops and offices.
ine being some distance from a railroad, ore is shipped to the smelter 110-h. p. traction engines and 24 ore-trucks, one engine hauling 5 trucks ng three 4-ton ore buckets each.
he smelter is described separately, under title of Pacific Smelting & Re-Co., Ltd., the owner.
roduction was begun May 19, 1908, previous statements in the press the mine was treating 500 tons of ore daily having been absolutely un-d. The first lot of matte, two carloads, was said to assay 40% copper, ilver and 2.5 oz. gold per ton. Costs are said by company to be $3.99 n for mining, $2.21 for transportation, and $2.48 per ton for smelting, indirect costs of $2.88, a total of $9.65 per ton, while miscellaneous s, including refining, marketing and taxes, bring total costs to $15.73 n. On 6% ore this would make a copper cost of 13 cents per lb., from should be deducted gold and silver values, these being, according to of first matte shipped, about 6.6 cents per lb. Company figures on an tion of $5.65 copper and $9.63 *per ton gold and silver*, and, deducting ter, estimates *that it can obtain copper at a net* cost of 5.64 cents per

pound, but these figures are not apt to be borne out by actual production a large scale, and, instead of gold and silver values amounting to 170% of copper values, as estimated by the company, the actual gold and silver val in the first lot of matte, were only a trifle more than 50% of the co values, showing a very marked discrepancy, the shortage in gold and si values being more than three-fourths. On May 1, 1905, President Dou stated that the company could make its copper at 2.8 cents per pound, revised figures, 1908, from the same authority, showed much higher estim costs. Mr. Douglas calculated that the net profits of the first operating would be $700,000, or 23.8% of the company's capitalization, and it will interesting to see how close this estimate comes to the actual facts. company figured on a production of 9,000,000 lbs. fine copper, from 6% at 10 cents per lb., with gold and silver values nearly paying for the cop giving copper at a net cost of only 1⅝ cents per pound, which figures m have been prompted by sheer ignorance, or intent to deceive. Company given out estimates of net earnings as high as $1,500,000 yearly, which ridiculous. The property is considered promising, though poorly located to transportation facilities, but such wild and utterly indefensible "estimate have been made by its officers and promoters, regarding percentage of o production, costs and profits, that the company is not regarded favorably.

DOUGLAS COPPER MINING CO. NEVAD

Dead. Succeeded, circa 1906, by Nevada-Douglas Copper Co. Former at Yerington, Lyon Co., Nev. Described Vol. VI.

DOUGLAS-ELY MINES CO. NEVAD

Office: 63 Wall St., New York, N. Y. Letter returned unclaimed fr former mine office, Ely, White Pine Co., Nev. John W. Keller, president; S ney S. Darling, vice-president; Cornelius A. Haggerty, treasurer; J. E. Simo secretary; preceding officers, Max Oberfelder, Samuel Joseph, Hon. Jas. Towners, Max G. Nickelsburg and Sidney Nickelsburg, directors. Organi under laws of Arizona, with capitalization $3,000,000, shares $1 par.

Lands, circa 600 acres, of which about 180 acres show copper indicatio and 420 acres carry indications of gold, silver and lead. Lands are on C Creek, near the Success mine, in the Duck Creek district, circa 14 miles sou east of Ely. In May, 1908, property had a 60′ tunnel, three 10′ test-pits and 70′ incline shaft, said to show ore giving good assays, and was said to emp 12 men. Is not regarded favorably.

DOUGLAS, LACEY & CO. U. S.

Office: 66 Broadway, New York, N. Y. This firm of swindlers has frauded upwards of 20,000 individuals out of several millions of dollars. Fi formerly had about 40 branch offices, in the United States and Canada, fr which utterly worthless mining stocks were peddled. In earlier years consid able bluffing was done, in the way of crude mining operations, but these e dently were merely for the purpose of keeping up appearances. Divide were paid on shares that had earned no profits, for which Douglas, Lacey Co. should have been jailed, for the common swindlers that they are, a doubtless would have been jailed, were the laws of the United States bet administered.

Efforts, begun November, 1903, to have the methods of this firm inve gated by the United States Postal Department, have come to naught, altho the matter was pushed persistently, and finally was taken to the president the United States, and by him referred back to one George Bruce Cortel then Postmaster-General, and later Secretary of the Treasury of the Uni *States, who* "investigated" the firm by advising them privately of *charges made against* them, and accepted their answer, which was that

pper Handbook is a blackmailing publication, this answer being per-tly satisfactory to the Hon. Mr. Cortelyou, best known as the gentleman o "fried the fat" out of sundry insurance companies and other corpora-ns, for the presidential campaign of 1904.

There is reason to hope that with the new administration, Mr. Cortelyou ll be permitted to apply otherwise the talents and energy that he has been ting, for some years past, to the public affairs of the United States, and s possible that Messrs. Douglas, Lacey & Co. will be overtaken, eventually, the punishment that they deserve.

OUGLAS MINING & MILLING CO. **WYOMING.**

Dead. Formerly at Rambler, Carbon Co., Wyo. Described Vol. VI.

OUGLAS MINING & SMELTING CO. **NEVADA.**

Dead. Succeeded by Douglas Copper Mining Co., latter bankrupt, 1905. rmerly at Yerington, Lyon Co., Nev. Described Vol. IV.

OUGLAS MOUNTAIN GOLD MINING & TUNNEL CO. **WASHINGTON.**

Office: 38 West Gay St., Columbus, Ohio. Mine office: Loomis, Okanogan nty, Wash. G. E. Bazler, general manager; J. J. Bennett, superintendent. ds, 20 claims, showing several veins of 7" to 8' width. A 50' tunnel, on the dle Falls claim, shows a 2' vein carrying auriferous chalcopyrite, galena and pyrites. Idle.

UGLAS SMELTER. **ARIZONA.**

Owned by Copper Queen Consolidated Mining Co.

VER MINING CO. **COLORADO.**

Mine office: Idaho Springs, Clear Creek Co., Colo. David Ellis, super-ndent, at last accounts. Ores carry gold, silver and copper. Has steam er. Presumably idle.

AGOON COPPER CO.

Office: 924 Columbus Ave., Boston, Mass. Moribund.

AGOON COPPER MINING & SMELTING CO. **ARIZONA.**

Office: 310 Frost Bldg., Los Angeles, Cal. Mine office: Tombstone, hise Co., Ariz. C. M. Renaud, president; Maj. W. Arthur Phipps, vice-ident; G. H. Mosher, secretary and treasurer; Geo. M. Henry, general ager. Organized May, 1902, under laws of Arizona, with capitalization 00,000, shares $1 par. Lands, 20 claims, area 400 acres, near the Middle-rch and opposite the Black Diamond, showing 3 contact veins between stone and porphyry, giving assays of 16% copper, 11% lead and 14 oz. r per ton, from azurite, malachite, bornite and chalcopyrite. Has 4 short nels and a 465' shaft, bottomed in good ore. Has steam power and a 34-hoist, good for depth of 1,000'. Property considered promising. Prac-lly idle since 1904, owing to lack of funds.

AGOON MINING CO. **ARIZONA.**

Dead. Lands sold circa 1907, to Bonanza Belt Copper Co. Formerly at ana, Cochise Co., Ariz.

AGOON MINING & DEVELOPMENT CO. **MEXICO.**

Mine office: Terrazas, Chihuahua, Mex. P. W. Robertson, manager. Has ntiferous and auriferous copper ore. Employs circa 35 men.

AGOON MOUNTAIN MINING CO. **ARIZONA.**

Letter returned unclaimed from former mine office, 533 Kearney St., San ncisco, Cal. Mine office: Pearce, Cochise Co., Ariz. Lee Wee, president; C. Mow, vice-president; Louis Fon, secretary; Leung Ting Mai, treasurer; K. Lake, superintendent, at last accounts. Organized under laws of Arizona, h capitalization $300,000. Lands, sundry claims near Middle Pass, in the gara Mountains, opened by shaft *and tunnel, giving* a promising showing ites carrying *copper, silver and gold. Company* was organized by Chinese

residents of San Francisco and Tombstone, Arizona. A little ore was shipp in 1905-06. Idle.

DRIPPING SPRINGS MINES & SMELTERS. ARIZON

Dead. Was succeeded, 1907, by London-Arizona Copper Co. Chas. Finney was president and general manager; F. L. Wright, vice-president; W. Brooks, treasurer; Robt. K. Porter, secretary and assistant treasurer; p ceding officers, Hon. R. E. Sloan and Paul Burk, directors. Was organiz 1907, with capitalization $5,000,000, shares $10 par. Formerly at Kelvin, Pi Co., Ariz.

DROGSET KOBBERVAERK. NORWA

Mine office: Röros, Trondhjem, Norway. Ore is slightly cuprifer pyrite. Latest recorded production was 2,718 long tons ore in 1900. Idle some years.

DRUMMERS DEVELOPMENT CO. WASHINGTO

Office: 15 Jamison Bldg., Spokane, Wash. Letter returned unclaim from former mine office, Chelan, Chelan Co., Wash. R. D. Johnson, presid Thomas Maloney, secretary. Capitalization $100,000, shares 10 cents pa Property, slightly prospected, shows ore of fair grade. Idle for several yea

DUBUQUE MINING & TUNNEL CO. COLORADO

Office: Colburn Bldg., Denver, Colo. Mine office: Idaho Springs, Cle Creek Co., Colo. E. A. Colburn, president; W. W. Kirby, vice-president; J A. Wright, secretary and treasurer; preceding officers, B. L. Gorich and D C. Waugh, directors. Organized Dec. 4, 1905, under laws of Colorado, wi capitalization $2,000,000, shares $1 par. Lands, 2 claims, known as th Dubuque mine, opened by a 460′ tunnel, said to show a 6′ vein carrying a paystreak showing copper carbonates and melaconite, with good gold value

DUCHESS MINING, MILLING & SMELTING CO. WYOMING

Letters returned unclaimed from former office, Cheyenne, Wyo., an former mine office, Holmes, Albany Co., Wyo. Lands, west of the Blanch are developed by a 100′ shaft, with steam plant. Did a little work in 190

DUCKTOWN SULPHUR, COPPER & IRON CO., LTD. TENNESSE

Office: 1 Greshan House, Old Broad St., London, E. C., Eng. Mine offic Isabella, Polk Co., Tenn. Col. Jas. LeGeyt Daniell, chairman; Jos. Gordo Gordon, managing director; preceding officers, F. Brown, L. G. Mortimer an H. G. Palmer, directors; Henry Godber, secretary; W. H. Freeland, genera manager; Chas. W. Kennrick, assistant manager.

Organized Feb. 16, 1891, under laws of Great Britain, with capitalizatio £75,000, shares £1 par, in £74,800 ordinary and £200 founder's shares; issue £66,000 ordinary and £200 founder's shares. Profits are divisible on the bas of 7%, plus one-half of the net remaining profits, to ordinary shares, balan of profits going to founder's shares. Debentures, £28,500, first-mortgage bon at 7%. Profits, 1905, were £65,741 net, and for 1906 were £104,388 net. Div dends, 1905, were 53⅓% on ordinary shares, and £152 18s. on founder's share and 1906 were 82½% on ordinary shares and £249 3s. on founder's share giving a dividend record, to Dec. 31, 1906, of 1,069% on ordinary shares an 51,785% on founder's shares.

Lands include the Mary, Callowell and other mines, bought for £68,05 Main shaft is circa 600′ deep, and ores are exclusively sulphide, averagin slightly under 3% in copper tenor, without either gold or silver values. Min equipment includes steam and electric power.

The smelter has a Herreshoff furnace, with daily capacity of circa 5 tons of crude ore, and a No. 6 Connersville blower, driven by a direct-co *nected engine*. The process of smelting was changed, 1905, and instead o *heap roasting* the ore, as formerly, semi-pyritic smelting is employed, producin

a 30% first-fusion matte and a 50% second-fusion matte. The change in smelting system at first reduced the capacity of the furnace by 48%, but eventually was brought to 16.5% net tonnage loss only, but effected a great saving in fuel charges, resulting in a saving of nearly 3 cents per pound on the cost of finished copper. The semi-pyritic smelting process first introduced by the Ducktown has been adopted by a number of other progressive smelters, and is highly commended by metallurgists. There is a small acid plant in connection with the smelter.

Production of fine copper has been as follows: 5,287,321 lbs. in 1904; 4,847,212 lbs. in 1905; 6,659,726 lbs. in 1906; 6,238,952 lbs. in 1907. The property is managed with great ability, both technically and financially, and ranks second only to the Tennessee among the copper mines of the Appalachian field.

DUGWAY COPPER MINING CO. **UTAH.**

Mine office: Callao, Juab Co., Utah. O. F. Peterson, general manager. Lands, in the Deep Creek district, have a 200′ shaft on a 15′ contact vein between limestone and porphyry, showing sulphide ore assaying up to 7.32% copper, 45% lead, 17 oz. silver and $1.60 gold per ton. Idle.

DUKE MINE. **NORTH CAROLINA.**

Office: care of Brodie L. Duke, owner, Durham, N. C. Mine office: Roxboro, Person Co., N. C. Thos. Morcom, superintendent. Lands, 470 acres, formerly known as the Tingen mine, showing fissure veins carrying copper ores, with gangue of epidote, calcite and quartz. Has 4 shafts, deepest circa 200′. Mine has produced some high grade ore, the last carload shipped averaging circa 17% copper and netting $1,100. Has steam power. Mine probably will be reopened.

DULUTH & ARIZONA COPPER MINING CO. **ARIZONA.**

Office: 219 West Superior St., Duluth, Minn. Letters returned unclaimed from former mine office, Prescott, Yavapai Co., Ariz. Chas. W. Ericson, president; Gideon Schelin, secretary. Organized circa 1902, with capitalization $1,000,000, shares $1 par. Lands, 4 claims, south of Prescott, showing ores said to give average assay values of 11% copper and $6 gold per ton. Idle for several years.

DULUTH & CHIRICAHUA DEVELOPMENT CO. **ARIZONA.**

Office: Duluth, Minn. Mine office: Paradise, Cochise Co., Ariz. Martin Pattison, president; Edward F. Sweeney, vice-president and general manager; Geo. H. Crosby, secretary and treasurer; preceding officers, Byron M. Pattison and Thomas Bardon, directors. Lands, 37 claims, including the Sullivan, Copperopolis and Horace Mountain groups. The Sullivan group, 7 claims, circa 4 miles west of the San Simon, has open-cuts, showing leached copper ore and a little very rich ore, and has a 60′ tunnel showing lead ore. The Copperopolis group, 8 claims, near the Sullivan, is slightly developed. Litigation over the Sullivan group was settled in company's favor, 1908. Management considered good and property promising. Idle except for annual assessment work.

DULUTH CONSOLIDATED COPPER CO. **IDAHO.**

Office: care of W. J. Holman, secretary and treasurer, Calumet, Mich. Mine office: Baker, Lemhi Co., Idaho. W. A. Eaton, president; Lucien Merritt, vice-president; Thos. W. Hamilton, general manager; preceding officers, John H. Holman, H. S. Palmer, Geo. W. Logan, John E. Merritt, John Lefevre and Sam P. Dingee, directors. Organized circa 1906, under laws of Arizona, with capitalization $5,000,000, shares $10 par. Lands are near the Calumet of Montana, in the Salmon River valley. Presumably idle.

DULUTH & UTAH DEVELOPMENT CO. **UTAH.**

Office: 26 Mesaba Blk., *Duluth, Minn.* *Operating office*: 208 Atlas Bldg., Salt Lake *City, Utah.* *Letter returned unclaimed* from former mine office,

Stockton, Tooele Co., Utah. H. F. Smith, president; Peter Porter, vice-president; Harvey J. Jones, secretary; E. J. Raddatz, treasurer and general manager. Organized under laws of Utah, apparently as successor of No-U-Dog Mining & Milling Co. Lands, 4 fractional claims, area 50 acres, near the Honerine tunnel, adjoining the Honerine mine on the north, which carries copper at considerable depth, and copper is expected in the Duluth & Utah at depth. Mine has circa 3,000′ of workings, deepest 500′, and ships ore carrying, 35 to 60% lead and 20 to 30 oz. silver per ton. Has produced circa $250,000 worth of silver-lead ores above the 500′ level.

DUNCAN MINING & DEVELOPMENT CO., LTD. BRITISH COLUMBIA

Mine office: Duncans, Vancouver Island, B. C. Lands, 4 claims, in the Cowichan Lake district, showing ore giving assays up to 4% copper, 50% lead, 5 to 10 oz. silver and $2.50 to $5 gold per ton. Idle since circa 1901.

DUNKIRK GOLD & SILVER MINING CO. ARIZONA

Office and mine: Prescott, Yavapai Co., Ariz. E. N. Mitchell, superintendent. Lands, in the Slate Creek district, show auriferous and argentiferous copper and lead sulphides. Has gasoline power and a small mill.

DUPLEX GOLD & COPPER MINING CO.

Office: 57-209 Washington St., Boston, Mass. Location of lands, if any, unknown.

DUQUESNE MINING & REDUCTION CO. ARIZONA

Office: 820 Pennsylvania Ave., Pittsburg, Pa. Mine office: Duquesne, Santa Cruz Co., Ariz. H. T. Herr, vice-president and general manager; H. S. Stewart, superintendent. Lands, circa 800 acres, near the Pride of the West and several miles south of the Mowry mines, in the Patagonia Mountains, showing a contact vein between limestone and granite porphyry, carrying chalcopyrite, associated with sphalerite, galena and pyrite, opened by a shaft of circa 1,000′ depth. Plans building an electric railway from mine to the smelter at Calabasas, which has reverberatory furnaces, and began production 1907, on a small scale, employing circa 100 men. Property considered promising and management good. Idle at last accounts.

COMPAÑIA MINERA DE COBRE DE DURANGO. MEXICO

Dead. Formerly at Otaez, Santiago Papasquiaro, Durango, Mex.

DURANGO COPPER SYNDICATE, LTD. MEXICO

Dead. Lands sold, 1900, to Avino Mines of Mexico. Ltd. Formerly at Avino, San Juan del Rio, Durango, Mex.

FUNDICIÓN EL DURAZNO. CHILE

Office and works· Combarbalá, Coquimbo, Chile. Francisco Greve G., owner. Property is a smelter with one reverberatory furnace, which, in 1903, employed 16 men at average wages of 1 peso daily, treated 810 metric tons of 15% ore from mines in Los Vilos district, producing therefrom 119 metric tons of bars averaging 97% copper, the slags averaging about 1% copper tenor.

DUTCH MILLER MINING & SMELTING CO. WASHINGTON

Letter returned unclaimed from former office, 202 Denny Way, Seattle, Wash. Mine office: Skykomish, King Co., Wash. H. P. Fogh, general manager. Capitalization $2,000,000. Property was leased, for 3 years, with privilege of one-year extension, to Seattle-Boston Copper Co. Creditors of the Dutch Miller asked, 1907, for a receiver, alleging mismanagement on the part of the lessee.

Lands, 2 claims, in the Burns district, 12 miles south of Skykomish, carrying a vein of about 15′ average width, exposed for circa 400′, and opened by tunnels, shaft and trenches showing auriferous chalcopyrite. Property considered promising.

DUTTON MINE. MONTANA

Owned by East Butte Mining Co.

DWIGHT FURNESS CO. **MEXICO.**

Office: Guanajuato, Gto., Mex. Mine office: Etzatlán, Ahualulco, Jalisco, Mex. Dwight Furness, president; W. M. Cummings, manager. Property includes nine groups of mines, in the Etzatlán, Ameca and Ahualulco districts. The Santa Grande group, 31 hectares, 21 miles west of Hostotipaquillo, shows veins of 3' to 50' width, carrying native silver and gold and silver sulphide ore, fairly developed by shafts and tunnels, with considerable ore exposed. The Casadas group, 21 hectares, 25 miles west of Hostotipaquillo, shows veins of 3' to 10' width, carrying native gold and silver and silver sulphides. The Magistral y Anexas group, 24 hectares, 12 miles southwest of Ameca, shows a wide vein, carrying paystreaks and chutes with workable values, of oxidized and sulphide copper ores, both carrying gold and silver, extensively developed by shafts and tunnels. Ores of the oxidized zone are largely worked out, from extensive operations in the past, mainly for the production of bluestone and sulphuric acid. The Calaveras group, 24 hectares, 4 miles south of Etzatlán, shows 4 fissure veins, of 4' to 6' width, carrying mainly auriferous and argentiferous sphalerite and galena, with 650' of workings, estimated to show 20,000 tons of ore.

EAGLE BIRD MINING & MILLING CO. **UTAH.**

Office: care of Geo. A. Whittaker, president, Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. Geo. Yeadon, general manager; E. E. Meyer, secretary; E. G. Mahon, treasurer. Organized 1907, under laws of Utah, with capitalization, $400,000. Lands, 14 claims, area circa 280 acres, near the Highland Boy mine, having a 260' tunnel and a 42' shaft, showing a 6' vein of ore assaying up to 37% lead.

EAGLE & BLUE BELL MINING CO. **UTAH.**

Office: 60 State St., Boston, Mass. Operating office: 700 McCornick Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. E. L. White, president; Willard F. Snider, vice-president; H. H. Green secretary; Walter S. McCornick, treasurer; preceding officers and Jos. A. Coram, directors; Wm. Clarke, superintendent. Capitalization $250,000, shares $1 par. Was controlled, through ownership of circa $190,000 stock, by Bingham Consolidated Mining & Smelting Co., which failed, and was under bond, March, 1908, to Bingham Mines Co., successor of the Bingham Consolidated.

Lands, 6 claims, between the Centennial-Eureka and Grand Central mines, in the Mammoth limestone, show considerable bodies of siliceous copper ore and lead sulphides, former carrying only small copper percentages, but circa $10 per ton in combined gold and silver values. Development is by tunnel and a 1,100' blind shaft, planned to be sunk to 1,400', showing an ore body up to 66' in width on the bottom level, said to carry values of $10 to $20 per ton in copper, silver and gold. The mine has considerable reserves, and normal ore output is about 75 tons daily. Production, 1907, was 227 carloads of ore. Mine was closed, late 1907, and reopened circa July, 1908. The property has a good machinery plant, including a powerful hoist.

EAGLE CONSOLIDATED GOLD MINING & MILLING CO. **WASHINGTON.**

Dead. Lands sold, 1908, for $13,000, to Blue Star Mining Co. Formerly at Chewelah, Stevens Co., Wash.

EAGLE CONSOLIDATED MINES CO. **ARIZONA.**

Office: care of T. J. Morrison, secretary, Prescott, Ariz. Letter returned unclaimed from former mine office, Wenden dale, Yuma Co., Ariz. A. J. Harrison, president; Dr. R. N. Looney, vice-president; C. A. Peter, Jr., treasurer; T. J. Morrison, secretary; preceding officers, A. J. Dolan, Michael McHale and James Macklin, directors. Organized circa September, 1907. Lands, 5 claims, 6 miles north of Wenden dale, having a 122' shaft showing a 30' vein carrying fair copper values in copper and gold.

EAGLE COPPER CO. **WYOMING.**

Dead. Formerly at Encampment, Carbon Co., Wyo. Succeeded Feb. 21,

EAGLE COPPER-GOLD MINING CO. ARIZONA

Office: 2072 East Fortieth St. S. E., Cleveland, Ohio. Letter returned unclaimed from former mine office, Wickenburg, Maricopa Co., Ariz. Wm. Kuder, president; E. L. Motts, vice-president; A. L. Motts, secretary; J. Zesiger, treasurer; preceding officers, Alex. M. Fulford and Henry Ehr directors; Nicholas McCarver, superintendent. Organized Sept. 8, 1902, und laws of South Dakota, with capitalization $1,000,000, shares $1 par.

Lands, 7 claims, 1 fractional, area 130 acres, known as the Profusion grou in the Blue Tank and Black Rock districts, in the foothills of the Bradsh Mountains, 12 miles east of Wickenburg, with connection by 10 miles of goo and 2 miles of bad wagon roads. Lands are reported to show 5 ore bodies, which 2 are partially developed, one of 12′ average reported width, traceab 3,000′, carrying native copper, cuprite, malachite and chalcopyrite, givin average assays of 4% copper, 2 oz. silver and $3.10 gold per ton. Developme is by tunnels of 35′ and 193′, and by shafts of 50′, 60′, 100′ and 150′. Has 16-h. p. hoist and 4-drill air-compressor, with 7 mine buildings. Company pla deepening shaft to 300′ and building a 50-ton concentrator.

EAGLE COPPER & GOLD MINING CO. IDAHO

Office: Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. O ganized 1902, under laws of Idaho, by J. H. Nordquist, et al., with capitaliz tion $1,000,000, shares $1 par. Lands, sundry claims near the Leslie, opene by a 150′ tunnel, showing copper ore, associated with hematite. Idle.

EAGLE COPPER MINING CO. WASHINGTON

Mine office: Chewelah, Stevens Co., Wash. Lands, 3 claims, lying sout of the Wonderful group, on Stevens Peak, slightly developed by shaft an tunnel, showing auriferous and argentiferous lead and copper ores. Idle.

EAGLE METALLIC COPPER CO. PENNSYLVANIA

Office and mine: Belvidere, Warren Co., N. J. Henry D. Deshler, presi dent; Samuel J. Koehler, treasurer; preceding officers, Frank C. H. Schwyzer Thos. Zellner, J. N. Boone, Owen H. Nagle and Thos. S. Downing, directors Miss Millie Deshler, secretary. Organized 1903, under laws of New Jersey with capitalization $500,000, shares $1 par.

Lands, 500 acres in Adams county, Pennsylvania, including an old copper mine, never worked successfully, on the western Maryland railroad. Property shows a mineralized zone of 400′ average width, carrying native copper, chalcocite, bornite, chalcopyrite and tetrahedrite, averaging about 2 oz. silver per ton, with traces of gold. Development is by a 300′ shaft at 40° incline, in ore from surface, giving assays up to 6% copper, and it is planned deepening the shaft 200′.

Equipment includes a steam plant and a 2⅝″ core-drill. Has a 24x36 office and laboratory, and plans a 200-ton mill. Has circa 5,000 tons of ore on the dump, ready for treatment.

EAGLE MINING CO. ALASKA

Letter returned unclaimed from mine office, Ketchikan, Alaska. E. M. Aldrich, consulting engineer. Lands, in the Martin's Arm district, on the coast, circa 40 miles from Ketchikan and 3 miles from tidewater, have a 5′ to 6′ vein traceable for 1,100′, said to give average assays of 19% copper. Plans a tram-line and bunkers, for ore shipment.

EAGLE MINING CO. CALIFORNIA

Mine office: Needles, San Bernardino Co., Cal. Idle.

EAGLE MINING CO. MONTANA

Office and mine: care of Hon. Patrick Mullins, director, Butte, Silver Bow Co., Mont. Organized March 10, 1906, under laws of Montana, with capitalization $150,000, shares $1 par, and is supposed to have increased capitalizati

r. 29, 1907, to $250,000, shares 50 cents par. Lands, north of La France, e a 250′ shaft, showing a 5′ vein. Formerly was a silver mine, shipping running up to 1.7% copper and 186 oz. silver per ton.

GLE MINING & SMELTING CO. **MONTANA.**

Dead. Title changed, 1907, to Copper Eagle Mining & Smelting Co. Forrly at Butte, Silver Bow Co., Mont.

GLE MOUNTAIN COPPER MINING CO. **OREGON.**

Office: 912-131 LaSalle St., Chicago, Ills. Mine office: Harrisburg, Linn , Ore. Wm. Henry Harris, president; W. K. West, vice-president; D. J. Allister, secretary and treasurer; preceding officers, Peter Basche, Geo. H. ster and Hon. W. G. Drowley, directors; Geo. E. Alexander, superintendent; W. C. Nelson, consulting engineer. Organized under laws of Arizona, with pitalization $2,500,000, shares $1 par. Lands, 8 claims, including the Cox d Van groups, near the Indiana mine, in the Goose Creek camp, 28 miles st of Baker City, showing a prominent gossan on a contact vein between rphyry and limestone. Company claims primary sulphide ores at depth of ' to 20′. Has a 10′ pit and several tunnels, of 30′ to 237′ length, latter said be in a 14′ ore body showing sulphide ore assaying 3 to 20% copper, with hort tunnel showing a 4′ vein carrying chalcocite and bornite assaying 10 to % copper. Nelson estimates long tunnel to show a 14′ vein averaging 3 to % copper, which has given ore assaying 3 to 20% in tenor. Company claims have $1,750,000 worth of ore in sight, by actual measurement, and claims hat it might claim $324,000,000 worth of ore in sight, this being one of the ost monumental prevarications in the history of mining literature, so richly overed with wild flights of the imagination. Has several substantial mine uildings, with 80-h. p. boiler and small Leyner air-compressor. Has a good ater power on Rice creek, which it is planned to harness for a 350-ton mill. roperty is reached by a good wagon road, and company hopes to obtain a ilroad. Employed circa 20 men at last accounts. Property considered promsing, but company's promises of dividends certainly were not warranted by he present showing and status of developments, and the so-called stock guarntee merely is that anyone who visits the property and finds same misrepreented may have his money back with interest.

EAGLE RIVER COPPER CO. **MICHIGAN.**

Dead. Lands sold, circa 1905, to a subsidiary company of the Calumet & Hecla. Formerly at Eagle River, Keweenaw Co., Mich.

EANKOPS COPPER MINING & SMELTING CO.

Office: Spokane, Wash. Organized 1906, under laws of Washington, with apitalization $1,500,000, by A. M. Baldwin, H. M. Allen, John H. Shaw and W. S. McCrea. Location of lands, if any, unknown.

EAST BUFFALO MINING CO. **MONTANA.**

Mine office: Saltese, Missoula Co., Mont. Has a tunnel and shallow shaft, showing ore assaying 5% copper, 15% lead and 8 to 10 oz. silver per ton.

EAST BUTTE COPPER MINING CO. **MONTANA.**

Office: 82 Devonshire St., Boston, Mass. Mine office: Butte, Silver Bow Co., Mont. Robt. H. Gross, president and general manager; Frank M. Sullivan, secretary; preceding officers, Frank P. Son, Wm. H. Everts and Chas. R. Leonard, directors. Organized Oct. 14, 1905, under laws of Arizona, with capitalization $3,000,000, shares $10 par. Is said to have begun business with $150,000 cash.

Lands, 134 acres, freehold, including the Dutton mine and 9 other fractional claims, with total area of 19 acres, in the southeastern part of the Butte camp, near the Pennsylvania mine. *The various properties are said to carry nearly 20 veins, of more or less value, and have 11 shafts,* of 50′ to 1,000′ depth.

The principal shafts are No. 1, at the extreme north, and No. 11, at th extreme south of the Dutton group, connected by tunnel. Shafts are 16x4' in the clear, being the largest in Butte. No. 1 shaft, 1,000' deep, is planned to be sunk to 2,000', and No. 11 is 500' in depth. Good ore has been opened on the 200', 400', 600' and 800' levels, and the mine was claimed, September 1907, to have blocked out, on the 400' level and above, 597,404 tons of ore, the 400' level having a 6' vein of 5% ore, with estimates of 1,000,000 tons of ore of 3 to 4% copper tenor blocked out in the entire property. The Dutton mine carries the extension of the Glengarry vein, about 20' in width, but of low grade. The Oneida mine, having shaft No. 11, has yielded considerable rich ore, up to 16% in tenor. The Lassen mine has produced a little ore carrying up to 16% copper and 10 oz. silver per ton. The Yankee Boy mine is said to show a 9' vein of ore averaging 14% copper, which is an exaggeration.

Equipment includes a 150-h. p. Lidgerwood hoist, good for 1,500' depth. The mine has an office building and several other structures.

The precipitation plant, one of the largest in Butte, doubled in size, 1907, leaches water from the East Butte mines, and also secures the leachings from the old Parrot waste-dumps. This plant apparently was sublet, for reasons of dubious validity, and difficult of comprehension, to other interests that pay a royalty of 25% on gross values extracted, which royalty is inadequate.

The property has 2 small old concentrators, operated by leasers, including the 100-ton Yankee Boy mill, and the management was said to plan a 500-ton concentrator, to cost about $135,000.

The South Butte Mining Co. has been sued for damages caused by the blowing up of the mine, and removal of ore. There also is litigation with the Red Metal Company, started by the latter, intended merely to restrain the pernicious activity of East Butte leasers in going beyond the boundary lines.

Production, 1907, is estimated at 1,250,000 lbs. fine copper, secured exclusively by lessees, about one-half of the output being smelting ore and balance of concentrating grade, operations of lessees being entirely above the 400' level. From Jan. 1, 1906, to Sept. 1, 1907, the royalties of the company, being one-fourth of the gross values extracted, amounted to $149,728.84. Property is considered good, and management, changed 1908, also is good.

EAST BUTTE EXTENSION COPPER MINING CO. MONTANA

Office and mine: Butte, Silver Bow Co., Mont. Chas. J. Schatzlein, president; A. C. McCallum, vice-president; Frank H. Cooney, secretary and general manager; J. K. Heslet, treasurer; preceding officers, John H. McQueeney, Jas. Maher and Dr. P. A. Green, directors; A. F. Monroe, engineer; Chas. Wyburn, superintendent. Organized Apr. 10, 1906, under laws of Arizona, with capitalization $1,000,000, shares $1 par; issued, $560,000. Paid, Oct. 1, 1906, a 1% dividend, amounting to $2,486.

Lands, sundry fractional claims, freehold, area circa 30 acres, lying west of the East Butte and between the Dutton, Belmont and Pennsylvania mines.

The Westlake and Wall mines are said to have produced, under former ownership, circa $300,000 worth of ore. No. 1 shaft on the Great Northern claim, 120' deep, has 2 compartments. No. 2 shaft, circa 200' deep, shows ore, giving assays up to 13% copper and 1 oz. silver per ton. No. 3 shaft, formerly known as the Westlake, is 1,040' deep. A little ore was produced, 1906, shipments reaching 40 tons daily, and there is a small precipitation plant at No. 3 shaft.

EAST COBAR MINING CO., N. L. AUSTR

Mine office: Cobar, Robinson Co., N. S. W., Australia. H. R. Treager. Organized 1907, under laws of New South Wales, with capit *£1,200, shares* 10s. par.

ST COLUSA MINE. **MONTANA.**

Owned by Boston & Montana Consolidated Copper & Silver Mining Co.

ST CUMBERLAND ELY CO. **NEVADA.**

Mine office: Ely, White Pine Co., Nev. Organized Nov. 1, 1906, under ws of Maine, with capitalization $500,000, shares $1 par. Lands, 2 claims, th of the Chainman mine, known as the Rabbit mine, which formerly pped some ore carrying up to 25% lead, 12 oz. silver and $12 gold per ton. s a 600′ tunnel with a 100′ winze.

ASTERN NATIONAL COPPER CO., LTD. **NOVA SCOTIA.**

Dead. Succeeded, 1904, by Cheticamp Copper Co., Ltd. Formerly at Chetimp, Inverness Co., N. S.

ASTER SUNDAY MINING CO. **ARIZONA.**

Office and mine: Bisbee, Cochise Co., Ariz. Has gold and copper ores. le since circa 1905.

AST GREENWATER COPPER CO. **CALIFORNIA.**

Mine office: Greenwater, Inyo Co., Cal. Geo. Badget, superintendent. nds, circa 6 miles east of Greenwater, adjoining the Greenwater Vindicator, ve a 100′ shaft. Idle.

AST GREY ROCK MINE. **MONTANA.**

Owned by Butte & Boston Consolidated Mining Co.

AST GWANDA MINES, LTD. **RHODESIA.**

Office: 32 Old Jewry, London, E. C., Eng. Mine office: P. O. Box 414, lawayo, Rhodesia. T. B. Reynolds, chairman; Maj. Maurice Heany, managg director; A. H. Lawrence, consulting engineer; F. Mackenzie Greene, mine nager; Tom Prest, secretary; Geo. Young, local secretary. Organized Jan. , 1905, under laws of Great Britain, with capitalization £600,000, shares £1 ar; issued, £460,607. Has a bond issue of £125,000 debentures, at 6%, convrtible into stock at par, on 3 months' notice. Lands, 284 claims and a 10-acre illsite, in the Gwanda district of Matabeleland, south of Bulawayo, including the West Nicholson, Jessie and Valley mines. Latter has a fissure vein granite, carrying auriferous chalcopyrite and pyrrhotite, with reserves estiated at 25,000 tons, assaying circa 1.5% copper and 12 dwts. gold per ton. as a 110-stamp mill, cyanide plant and concentrator. Has a smelter, the first Rhodesia, blown in 1906, having a 24″ water-jacket blast-furnace and a verberatory furnace. To end of May, 1907, smelter had shipped 560 tons matte, of presumably about 45% copper tenor. Production, 1906, from ,575 tons of ore milled, was gold and silver values of £77,480, and 2,255 long ns of concentrates, yielding £31,017, and 323 long tons of copper matte, of 14,406 estimated value, carrying circa 725,000 lbs. fine copper. Forces are 60 hite men and 400 natives. Company made some serious mistakes at first, but ese have been rectified, and present development and future prospects are much improved.

EAST HECLA MINING CO. **IDAHO.**

Office and mine: Wallace, Shoshone Co., Idaho. C. F. O. Merriam, president; A. H. Featherstone, vice-president; P. L. Everhardt, secretary; preceding officers, Jas. F. McCarthy, W. H. North and Dr. Geo. Gray, directors. Lands, 25 claims, between the National and Hecla mines. Is driving a 2,500′ crosscut tunnel from Deadman Gulch, in connection with the Copper King, to develop the vein circa 1,000′ below present workings. Property considered promising.

EAST PACIFIC MINING CO. **MONTANA.**

Mine office: Winston, Broadwater Co., Mont. Robt. A. Bell, president and al manager; C. N. Kessler, vice-president; A. L. Smith, treasurer; W. H. inson, cashier; preceding officers and C. C. Newman, directors. Capitaliza— $1,000,000, *shares $1 par. Lands, 14 claims,* area 220 acres. Mine has

about 4 miles of workings, carrying mainly silver-lead ores, with some au erous copper ore. Has a 60-ton mill, and, to end of 1906, had produced worth $1,366,527.

EAST-SIDE GOLD MINING CO. ARIZO

Dead. Formerly at Bisbee, Cochise Co., Ariz. Fully described Vol. VI

EAST SNOWSTORM-COEUR D'ALENE MINING CO. IDA

Mine office: Mullan, Shoshone Co., Idaho. Capitalization $1,500, shares $1 par. Apparently was promoted, circa 1906, by the late Rev. Col. P. Fife, whose promotions proved more profitable to Rev. Col. Fife than the purchasers of shares.

EAST SNOWSTORM MINING CO. IDA

Office: 300 Columbia Bldg., Spokane, Wash. Mine office: Mullan, S shone Co., Idaho. A. Herman, president; J. F. Pasold, vice-president; R. Dunn, treasurer; John M. Scrafford, manager. Organized 1906, under law Washington, with capitalization $1,500,000, shares $1 par. Lands, 4 cla area 75 acres, in the Hunter district, east of the Snowstorm, and supposed carry circa 3,000′ of the Snowstorm vein. Mine has 2 tunnels, longest circa 9 planned to cut the Snowstorm vein by a 600′ crosscut; also a shallow shaft a 6′ vein carrying an 8″ paystreak of chalcocite, bornite, chalcopyrite tetrahedrite, all auriferous. Ores, as developed, carry mainly gold values.

EAST YERINGTON COPPER CO. NEVA

Office: care of Matthew Domm, treasurer, Salt Lake City, Utah. M office: Yerington, Lyar Co., Nev. Lands, adjoining the Contact group, w slightly prospected, 1907, showing a little high-grade copper ore.

J. M. ECHEVARRIA. CHI

Office and mine: Illapel, Coquimbo, Chile. Property is the Quilom mine, opened 1892, which formerly made about 100 long tons fine co yearly. Presumably idle.

ECHO COPPER MINING & MILLING CO. WYOMI

Office: 413-95 Dearborn St., Chicago, Ills. Mine office: Rudefeha, Car Co., Wyo. Dr. Geo. Illingsworth, president; W. D. Meeker, vice-president; R. Stiles, secretary; W. T. Peryam, managing director. Organized Dec. 1902, under laws of Wyoming, with capitalization $1,000,000, shares $1 Lands, 4 claims, area 80 acres, adjoining the Ferris-Haggarty mine on northeast, opened by a 114′ shaft, showing copper stains. Did a little w in 1906. Idle.

ECHO MINING CO. IDA

Dead. Formerly at Sandpoint, Kootenai Co., Idaho. Described Vol.

ECLIPSE-ARGO MINING CO. MONTA

Office: New Britain, Conn. Operating office: Helena, Mont. Mine of Argo, Broadwater Co., Mont. W. F. Quade, president; Frank L. Sizer, president and general manager; E. J. Hoffman, secretary and treasurer; ceding officers, John Boyle, F. R. Bill, I. F. Pulcifer and E. G. Warner rectors; E. J. Clemo, superintendent.

Organized March 6, 1904, under laws of Montana, with capitaliza $300,000, increased, circa November, 1906, to $400,000, shares $1 par, merger of the Eclipse Gold & Copper Mining Co. and Argo Gold & Copper ing Co. Receipts for fiscal year ending June 1, 1908, were $119,093.30, inc ing $88,041.85 from ore sales, and cash on hand was $1,371.59, with $5,94 in accounts receivable; accounts and bills payable aggregating $17,107.57.

Lands, 5 claims, 2 patented, area 100 acres, and a 10-acre millsite, n of Helena. Property shows a 10′ fissure vein, in slate, traced circa one-h mile, carrying bornite and chalcopyrite assaying circa 7% copper, opened *tunnels of about 700′ and 1,300′, with about 3,000′ of workings.*

Equipment includes a 40-h. p. steam plant with a 15-h. p. hoist and 3-drill air-compressor. There are 12 buildings, including a 20x25' wooden carpenter-shop and a 14x18' smithy.

The 50-ton mill, 60x140', of logs and lumber, has a Blake crusher, 2 sets of rolls, 3 Hartz jigs, 2 Wilfley tables and a slime table.

Management was changed, June, 1906, and circa 50 men were employed until November, 1907, when work was suspended. Production, 1903, was 204,570 lbs. fine copper, and in the fiscal year ending June 1, 1907, was 1,124,000 lbs. fine copper.

ECLIPSE (BARBERTON) COPPER, LTD. **TRANSVAAL.**

Office: Johannesburg, Transvaal. Mine office: Barberton, Middelburg district, Transvaal. Percy B. Byass, manager. Organized under laws of Transvaal, with capitalization £600,000, shares £1 par. Lands, 72 base metal claims, in the DeKaap Valley, near Barberton, opened by 3 shallow shafts, Nos. 1 and 2 showing good ore. Shipped, early 1908, a little ore of about 20% copper tenor. Property considered promising.

ECLIPSE GOLD & COPPER MINING CO. **MONTANA.**

Dead. Was merged, 1904, in Eclipse-Argo Mining Co. Formerly at Argo, Broadwater Co., Mont.

EDDY GOLD, SILVER & COPPER MINING CO. **ARIZONA.**

Office: P. O. Box 596, Phoenix, Ariz. Mine office: Glendale, Maricopa Co., Ariz. F. L. Eddy, president and general manager; J. R. Aich, vice-president; S. P. Donnell, secretary and treasurer. Organized Aug. 22, 1902, under laws of Arizona, with capitalization $1,000,000, shares $1 par. Lands, 10 claims, area 200 acres, also a 5-acre millsite, in the Frog Tank Mountains, Old Eddy district. A 3' fissure vein in porphyry, opened by six 10' pits, a shaft of 52' and tunnels of 55' and 105', carries oxide and carbonate ores, assaying 4 to 6% copper, 12 to 60% lead, 10 to 62 oz. silver and $5 to $32 gold per ton. Idle several years.

EDDY MINING CO. **MONTANA.**

Office: Missoula, Mont. Mine office: Saltese, Missoula Co., Mont. A. M. Stevens, secretary. Lands, on Clark's Fork, near Copper Mountain, show a vein up to 34' in width, proven for about 6,000' length by numerous pits and crosscuts, with a tunnel of 355'.

EDISON MINING CO. **BRITISH COLUMBIA.**

Mine office: Yreka, Vancouver Island, B. C. Property is the Superior group, adjoining the Yreka, said to show good ore. Idle for several years.

EDMUNDIAN (MANICALAND) COPPER CO., LTD. **PORTUGUESE EAST AFRICA.**

Dead. Voluntarily liquidated, July, 1902. Formerly at Umtali, Manicaland, Portuguese East Africa.

EDMUNDIAN COPPER MINING CO. **PORTUGUESE EAST AFRICA.**

Office: 8 Old Jewry, London, E. C., Eng. Mine office: Umtali, Mozambique, Portuguese East Africa. H. D. Boyle, chairman; preceding officer, J. Sivar and E. R. Tymms, directors; N. S. Sidgreaves, secretary; Consolidated Goldfields of South Africa, Ltd., consulting engineers. Organized Aug. 7, 1907, under laws of Great Britain, with capitalization £135,000, shares £1 par; issued, 85,000. Was promoted by the Consolidated African Copper Trust, Ltd., which controls through stock ownership, and which advanced working capital, repayable Aug. 15, 1910, in cash or shares.

Lands, 202½ copper claims, including the Edmundian mine, which, circa 1906, shipped 2,377 long tons of 20% copper ore to England for test smelting. Mine is opened to the 7th level, with *estimated ore reserves* of 22,799 long tons of 5% copper *tenor. A small smelter, with a reverberatory* furnace, was built,

circa 1906, and company planned beginning smelting October, 1908. Pro
erty considered promising.

EIGHTY-FIVE MINING & MILLING CO. NEW MEXIC

Office: care of Jas. Barclay, Moline, Ills. Mine office: Lordsburg, Gra
Co., N. M. Organized late in 1907, with capitalization $1,000,000, apparent
succeeding the Eighty-Five Mining Co. Lands, in the Virginia district, sh
ore carrying good values in gold, silver and copper.

EINASLEIGH AMALGAMATED COPPER MINES, LTD. AUSTRALI

Office: Adelaide, South Australia. Mine office: Einasleigh, Queensla
Australia. Organized circa May, 1908, with capitalization £52,500, shares
par, as a merger of the Einasleigh Proprietary, Ltd., and an exploring syn
cate that held Block 55, adjoining.

EINASLEIGH EXPLORATION SYNDICATE, LTD. AUSTRALI

Offices: 20 Copthall Ave., London, E. C., Eng. Mine office: Einasleig
Gilbert Co., Queensland, Australia. W. H. Woodhead, managing direct
Thos. Mullett, secretary. Organized Aug. 16, 1899, with capitalization £4,0
shares £50 par; issued, £3,850. Lands, 100 acres, on the Einasleigh river, G
bert county, Queensland, Australia. Idle practically since birth.

EINASLEIGH FREEHOLD COPPER MINES, LTD. AUSTRALI

Dead. Reorganized, Jan. 17, 1907, as New Einasleigh Copper Mines, L
Formerly at Einasleigh, Gilbert Co., Queensland, Australia. Fully describ
Vol. VI.

EINASLEIGH PROPRIETARY, LTD. AUSTRALI

Office: Rockhampton, Queensland, Australia. Mine office: Einasleig
Queensland, Australia. R. S. Sarcher, chairman. At last accounts, May, 19
planned amalgamating with an Adelaide syndicate owning lease No. 55, und
title of Einasleigh Amalgamated Copper Mines, Ltd.

EINASLEIGH SOUTH BLOCKS. AUSTRALI

Mine office: Einasleigh, Gilbert Co., Queensland, Australia. Lands, sund
claims lying south of the Einasleigh Freehold. Idle some years.

EISFELDER KUPFERGEWERKSCHAFT. GERMAN

Mine office: Glücksbrunn, Saxe-Meiningen, Germany. Capitalizatio
600,000 marks. W. A. Mertens, smelter superintendent, at last accounts. D
velopment is by 2 shafts. Presumably idle.

EL CAPITAN COPPER CO. ARIZON

Dead. Was a swindle, perpetrated by the notorious firm of Douglas, Lac
& Co. This firm reported, Jan. 30, 1904, that the property had been absorb
and that its stock was to be exchanged, but, for purposes best known to t
firm, the company apparently has been kept alive, and the office address
New York continued in the city directory. Formerly at Kirkland, Yavap
Co., Ariz.

EL CAPITAN MINING CO. ARIZON

Letter returned unclaimed from former mine office, Kirkland, Yavapai C
Ariz. Lands, 5 claims, 5 miles from Kirkland, having a 60′ two-compartme
shaft showing a quartz vein, of 18″ to 3′ width, carrying auriferous and
gentiferous copper ore.

EL CARMEN COPPER CO. MEXIC

Office: 52 Front St., New York, N. Y. Mine office: San Juan de Hered
El Oro, Durango, Mex. Thos. P. Ball, president; Stephen A. Levy, secreta
and treasurer; I. Wayne Von Leer, general manager. Organized August, 18
under laws of New York, with capitalization $750,000, shares $100 par. Lan
400 acres, 45 miles from a railroad, also 31,000 acres miscellaneous lands. D
velopment has shown a considerable body of auriferous and argentiferous co

per ore, of concentrating grade. Has a large pumping plant, with a 3½-mile pipe-line, and a 40-stamp mill. Idle.

EL CARMEN MINING CO. **MEXICO.**

Mine office: San Javier, Hermosillo, Sonora, Mexico. Organized 1905, under laws of Arizona. Presumably idle.

EL COBRE MINES. **CUBA.**

Dead. Succeeded Jan. 5, 1907, by Cuba Copper Co. Formerly at El Cobre, Santiago de Cuba. Very fully described Vol. VI.

EL COBRE MINING CO. **MEXICO.**

Office: 248 Equitable Bldg., Denver, Colo. Mine office: Hermosillo, Sonora, Mex. A. S. Mackenzie, vice-president and general manager; Guy C. Cravens, secretary. Organized under laws of District of Columbia, with capitalization $5,000,000, shares $1 par.

Lands, circa 1,000 acres, including La Gran Duquesa and Transvaal mines, and a smelter site, in the Ures district, about 60 miles east of Hermosillo, to which point there is a good wagon road. Ores are claimed to give average smelter returns of 20.1% copper, 1.75 oz. silver and $4 gold per ton. The company's fiscal agent, F. A. Wright, of Chicago, advertised, October, 1904, that it was estimated by experts that on less than 50 acres of this ground the first 50 feet in depth would give more than 500,000 tons of gold-copper ore that, when smelted, would yield a net profit of over $10,000,000. Such abominable lies necessarily place both management and property under suspicion. Idle and apparently moribund.

EL DIAZ GOLD & COPPER CO. **MEXICO.**

Dead. Formerly at San Martín Hidalgo, Ameca, Jalisco, Mex. Described Vol. V.

EL DORADO COPPER CO. **ARIZONA.**

Office and mine: Globe, Gila Co., Ariz. J. M. Bice, Chas. E. Beck, Forest A. Zimmerman, Jas. Rocks and H. C. Hanawalt, directors. Organized Jan. 29, 1907, under laws of Arizona, with capitalization $1,000,000, shares $1 par.

EL DORADO COPPER MINING CO. **CALIFORNIA.**

Dead. Succeeded, circa 1906, by Woodside-Eureka Mining Co. Formerly at Georgetown, El Dorado Co., Cal.

ELDORADO GOLD MINING & MILLING CO. **UTAH.**

Office: 549 25th St., Ogden, Utah. Mine office: Hot Springs, Box Elder Co., Utah. Don Maguire, manager. Ores carry silver, lead and copper. Idle.

ELDORADO MINING CO. **IDAHO.**

Letter returned unclaimed from former mine office, Kellogg, Shoshone Co., Idaho. Organized circa July, 1907. Lands, 4 claims, about 1 mile east of Kellogg.

ELDORA ENTERPRISE GOLD MINING CO. **COLORADO.**

Mine office: Eldora, Gilpin Co., Colo. Ores carry gold, silver and copper. Has steam power and a 10-ton smelter. Presumably idle.

ELECTRA MINING & MILLING CO. **ARIZONA.**

Office: care of Alfred Day, fiscal agent, P. O. Box 513, Steubenville, Ohio. Lands, somewhere in Arizona, are claimed to show ore giving average assays of $27 per ton. Out of money, idle and apparently moribund.

ELECTRIC IRON & STEEL CO. **CALIFORNIA.**

Dead. A fraud, perpetrated by W. C. Brunson and J. W. Turner, who falsely claimed to own 7,000 acres of rich mining land in Shasta county, California.

ELECTRIC MINING & MILLING CO. **NEW MEXICO.**

Mine office: Orogrande, Otero Co., N. M. *In 1907 planned building a concentrator.*

ELECTRIC SMELTING & REFINING CO. ONTA

Works office: Sturgeon Falls, Nipissing, Ont. Was said, early 190 have completed a custom smelter.

SOCIEDAD ELECTROLITICA MANUFACTURERA DE COBRE. CHI

Office and works: Santiago de Chile. Organized Jan. 13, 1906, under of Chile, with capitalization 500,000 pesos, shares 100 pesos par.

ELECTROLYTIC COPPER CO. OREG

Office: 14 Century Blk., Mason City, Iowa. A. L. Ober, chairman; ceding officer, F. S. Kingsbury, F. B. Platt and J. F. Ferry, executive c mittee. Organized under laws of Washington, with capitalization $1,500, shares $1 par. Has no connection with the Electrolytic Copper Mining & Sm ing Co. Lands, 28 claims, partly fractional, said to be located somewhere Oregon, showing 5 ore bodies, said to range 10′ to 25′ in width, with a la gossan covering the wider ledge, veins being crosscut by tunnel.

ELECTROLYTIC COPPER MINING & SMELTING CO. OREG

Dead. Formerly at Imnaha, Wallowa Co., Ore.

ELECTROLYTIC REFINING & SMELTING CO OF AUSTRALIA, LTD. AUSTRAL

Works office: Port Kembla, N. S. W., Australia. Capt. G. A. Richard, g cral manager; Benj. Mangus, supervising engineer. Organized 1907, with c italization £150,000, practically as a subsidiary corporation of the Mount M gan Gold Mining Co., Ltd. Lands, 50 acres, at Port Kembla, in vicinity Sydney, but said, November, 1907, to be negotiating with the Queensland g ernment for new site, owing to trouble with government over an attempt levy oppressive harbor dues, the Australian federal and state governme seeming very obtuse, and perniciously active in penalizing new industri Works are planned to smelt copper ores and concentrates, and to convert ma to blister copper, and are planned to include, ultimately, an electrolytic finery. Works have a capacity of about 40 tons daily of refined metal, a are planned to treat ores and blister copper from the Mount Morgan and oth Australian mines now shipping their products abroad for refining.

ELENITA DEVELOPMENT CO. MEXIC

Office: Wolvin Bldg., Duluth, Minn. Letter returned unclaimed fr former mine office, La Cananea, Arizpe, Sonora, Mex. Louis W. Powell, m ager. Capitalization $200,000, shares $10 par; $5 paid in. Lands, circa 7 hectares, including property formerly owned by Bonanza de Cobre Mining C lying north of the Greene smelter, and extending to a point nearly opposite Puertecitos mines of the Greene-Cananea. Mine gives a promising surf showing, and has 2 shafts, in good ore. Property considered promising management good.

EL GLOBO MINING & MILLING CO. MEXIC

Office: 821 Railway Exchange Bldg., Milwaukee, Wis. Mine office: Na zari, Moctezuma, Sonora, Mex. Chas. A. Romadka, president and general m ager; C. G. Porter, secretary. Organized 1905, under laws of Arizona, w capitalization $400,000, shares $100 par. Ores carry mainly gold and sil values. Has a 15-stamp mill and cyanide plant.

AGUSTO ELGÜE. CHIL

Mine office: Guayacan, Peña Blanca, Aconcagua, Chile. Property is San Pablo mine, 15 kilometers from Peña Blanca, showing a vein of about meter average width, which has produced about 600 metric tons of 9% c per ore.

ELITE GOLD & COPPER MINING CO. WASHINGTO

Dead. Formerly at Index, Snohomish Co., Wash.

KUPFERERZBERGWERK ELIZA. **GERMANY.**

Mine office: Mallau, Elsass, Germany. Idle some years.

ELIZABETH COPPER CO. **VERMONT.**

Dead. Succeeded, circa 1907, by Vermont Copper Co. Formerly at South Strafford, Orange Co., Vt. Fully described Vol. VI.

ELIZABETH MINING CO. **VERMONT.**

Dead. Succeeded, 1905, by Elizabeth Copper Co. Formerly at South Strafford, Orange Co., Vt. Fully described Vol. V.

ELKHORN COPPER MINING CO. **MONTANA.**

Office: Dillon, Mont. Mine office: Argenta, Beaverhead Co., Mont. H. H. Swain, secretary. Mine, known as the Blue Eyed Annie, has a 100′ shaft. Presumably idle.

ELKHORN GOLD & COPPER MINING CO. **UTAH.**

Office and mine: Ogden, Weber Co., Utah. S. W. Cragun, president; M. A. Poulton, vice-president; Carl Allison, secretary and treasurer. Organized circa November, 1907, under laws of Utah, with capitalization $500,000, shares 10 cents par. Lands are in the Sierra Madre district of Box Elder county, Utah.

ELKHORN MINING CO., LTD. **BRITISH COLUMBIA.**

Mine office: Greenwood, Boundary district, B. C. Jas. Sutherland, president. Mine, under development at last accounts, had auriferous and argentiferous lead and copper ores.

ELK MOUNTAIN MINING CO. **NEVADA.**

Mine office: Three Creek, Owyhee Co., Idaho. M. S. Estes, president and general manager; Neil Beaton, vice-president; C. W. Robinett, secretary and treasurer. Capitalization $500,000, shares $1 par. Lands, 5 claims, in Elko county, Nevada, 8 miles from the Idaho line, about 16 miles northwest of Contact, Nev., and connected therewith by a good wagon road. Has a 14′ contact vein, between limestone and granite, of silicious sulphide ore, said by company to average 6% copper, 7 oz. silver and 0.04 oz. gold per ton, apparently from a single streak, opened by a 40′ tunnel. Company planned installing a smelter, 1908, but such installation is not justified by the limited development secured.

ELK MOUNTAIN MINING & MILLING CO. **WYOMING.**

Office and mine: Encampment, Carbon Co., Wyo. T. B. Smith, president; W. R. Phelps, vice-president; S. E. Phelps, secretary and treasurer; J. F. Tillou, general manager; G. S. Taylor, superintendent. Organized 1900, under laws of Wyoming, with capitalization $1,000,000, shares $1 par. Lands, 640 acres, patented, well timbered, in the northernmost hills of the Medicine Bow Mountains, showing contact deposits between limestone and schist, opened by an 80′ tunnel and 3 shafts, deepest 183′, carrying bunches of chalcocite in upper workings, giving place at depth to chalcopyrite. Has steam and electric power. Property considered promising. Idle.

ELLA COPPER MINING & DEVELOPMENT CO. **CALIFORNIA.**

Letter returned unclaimed from former office, San José, Cal. Mine office: New Almaden, Santa Clara Co., Cal. Lands, near the New Almaden cinnabar mine, are claimed to show a 40′ vein of 10% copper ore, which is a wilful and disastrous exaggeration.

ELLAMAR MINING CO. **ALASKA.**

Mine office: Ellamar, Prince William Sound, Alaska. J. D. Meenach, manager; Wm. Page, superintendent. Lands, on Virgin Bay, circa 20 miles south of Valdez, known as the Gladhaugh mine, have a 600′ shaft, with 6 levels cut, on a lense that is about 80′ wide and 190′ long, on the 200′ level, ore occurring as a contact vein between limestone and slate, carrying mainly chalcopyrite, associated with pyrite and pyrrhotite in a gange of country rock,

with occasional massive sulphides, ore bodies apparently improving in d
Was the first copper producer of Alaska, beginning shipments circa 1901.
as shipped, averages about 7.4% copper and 1 oz. silver per ton, with a
of gold. Has substantial mine buildings. Was said in press, May, 1907, to
been sold to the Hubbard-Elliott Copper Mines Development Co., but a
ently this was not true. Production, 1907, estimated at 1,000,000 lbs. fine
per. Property considered promising.

ELLA MINING CO. MONT

Dead. Was capitalized at 16,000 shares. Lands, lying next east o
Reins, were sold, Dec. 1, 1906, for a reported consideration of $240,000,
Reins Copper Co. Formerly at Butte, Silver Bow Co., Mont.

EL MAGISTRAL COPPER CO. ME

Office: 1 Madison Ave., New York, N. Y. Mine office: Choix, F
Sinaloa, Mex. H. L. McNair, president; Hon. C. F. Wright, vice-presider
G. Nash, secretary and treasurer; preceding officers, Hon. W. S. Leib, Th
Carvin, H. R. Woodward, John J. Dowdle, John P. Fiebig, John G. Whi
and Hon. G. E. Green, directors. Property is the entire capital stock
San Lucas Copper Co.

EL MAJIN COPPER CO. ME

Dead. Formerly at Hermosillo, Sonora, Mex.

ELM ORLU MINING CO. MONT

Office and mine: Butte, Silver Bow Co., Mont. Arthur H. Wethey,
ager; preceding officer, Hon. Wm. A. Clark, Wm. A. Clark, Jr., Wm. Bic
and A. J. McGinn, directors. Organized January, 1907, with capitali
$1,000,000, shares $1 par.

Lands, 2 claims, known as the Elm Orlu and Poser, north of Walke
and west of the Black Rock group of the Superior & Boston. Mine has a
shaft, showing, at depth of 500′, a 6′ vein of highly argentiferous coppe
assaying up to 4.5% copper and 100 to 300 oz. silver per ton, with
gold values. The 700′ level shows chalcocite, and management plans
cutting extensively on the 1,000′ level. Property considered promising
management good.

ELM RIVER COPPER CO. MICHI

Office: 60 State St., Boston, Mass. Mine office: Winona, Houghto
Mich. H. F. Fay, president; Geo. G. Endicott, secretary and treasurer
ceding officers, John C. Watson, Stephen R. Dow and Chas. N. King, dire
Capt. Samuel Chynoweth, superintendent. Organized Apr. 20, 1899, under
of New Jersey, with capitalization $1,200,000, shares $12 par, fully paid.
Colony Trust Co., Boston, registrar. Annual meeting, third Wednesd
April, at Jersey City.

Expenditures, 1907, were $40,274.92, leaving a balance on hand, J
1908, of $86,341.74, with liabilities of only $980.62.

Lands, 2,300 acres, in Section 6, Town 52 North, Range 35 West; Se
1, 2, 11 and 12, Town 52 North, Range 36 West, and Section 36, Town 53
Range 36 West; also a millsite in Section 30, Town 54 North, Range 36
on the shore of Lake Superior. Nearly a complete cross-section of the
has been secured by upwards of 5,000′ of diamond drill borings, these sh
a heavy overburden on nearly all of the lands. Borings have given
carrying copper, in variable quantities, from a number of different beds.

Considerable sinking and drifting has been done on several copper-be
beds, at different points. Shafts No. 1 and 2, former 800′ and latter 200′
are on the Winona lode. No. 3 shaft, 100′, and No. 4 shaft, 50′, are on
Shawmut lode. No. 5 shaft was sunk on an unidentified lode, located by dia
drill. *No. 1 shaft*, the first shaft started, was abandoned at 100′, but wa

, 1903. No. 1 shaft is 9x14′ in size, sunk in the footwall of the Winona aloid, at an angle of 72°. Crosscuts and drifts on the 500′ level show a ygdaloid carrying copper in unpayable quantities. On the 800′ level nd south drifts show a healthy bed of 12′ to 16′ width, but no profitable was opened there. In crosscutting west from the Winona lode 12 other ous amygdaloids were cut, but none were found of commercial value. 1907 the equipment was moved from No. 1 shaft to a new site, about st of the Winona lode, and No. 7 shaft was started, in virgin territory, unidentified bed from which a core showing copper had been secured ars previously.

ew vertical shaft is being sunk in search of the Lake bed. This is lo- out 1 mile northeast of the former workings, north of the center of heast ¼ of Section 11, somewhat west of the hypothetical horizon of lode. This shaft was 104′ deep, Oct. 15, 1908, having cut a few string- opper, and is planned to be sunk to a depth of 200′ or 300′, thence ing to the eastward, in search of the Lake lode. A drill-hole, bored owed a little copper in an amygdaloid occupying the hypothetical hori- he Lake lode.

ipment includes a duplex hoist good for 1,000′ depth, 2 Burt marine nd a 4-drill air-compressor. Water is taken from a dam by a Blake Buildings include a 40x40′ carpenter-shop, 28x65′ two-story warehouse, ng house with accommodations for 100 men, schoolhouse and a number ings.

Elm River has been searching nearly ten years for some payable cop- on which to open a mine, and, while results to date have been of a nature, the company is following the correct policy in continuing nd its prospects are perhaps better than ever before, notwithstanding of work without results.

VENIR MINING & MILLING CO. **MEXICO.**

ce: 406 Wilson Bldg., Dallas, Tex. Mine office: Cuatro Ciénegas, a, Coahuila, Mex. J. Y. Webb, Jr., president; W. W. Batcheler, vice- t; Frank Reedy, secretary and treasurer. Organized under laws of , with capitalization $1,000,000. Lands, 244 acres, 30 miles northwest o Ciénegas. Company expects to have railroad transportation within Deepest shaft, circa 250′, remains in the oxidized zone, mine having r mile of workings, with one tunnel in ore. Has shipped several car- low grade ore, returning circa 4.3% copper and 300 grams silver per ton.

OGRESO COPPER MINING CO. **MEXICO.**

d. Stockholders were given shares of Imperial Corona Gold Mining xchange. Formerly at Ayutla, Autlán, Jalisco, Mex. Described Vol. III.

Y GOLD & COPPER MINING CO. **WYOMING.**

ler returned unclaimed from former office and mine, Encampment, Car- Wyo. J. W. Hedding, secretary. Idle since 1905, but annual meeting Encampment, July 15, 1908.

O COPPER MINING CO. **MEXICO.**

e office: Tepezalá, Ocampo, Aguascalientes, Mex. J. Frank Gray, sec- nd treasurer. Organized 1907, under laws of Colorado, with capitaliza- 000,000.

ADAIR COPPER MINING CO. **AUSTRALIA.**

e office: Port Augusta, South Australia. A. M. Hardy, manager, at ounts. Has steam power. Presumably idle.

MINING CO. **COLORADO.**

d. Formerly at *Winfield, Chaffee Co., Colo.*

EL SUEÑO MINING CO. MEXI

Mine office: Tijuana, Norte, Baja California, Mex. Hugh T. Duff, sup intendent. Has auriferous and argentiferous copper ores. Has gasoline po and Huntington mill, and is said to have a very small smelter, known as Cuera de Venado.

MINA EL TESORA. MEXI

Office and mine: care of Don Emiliano Ybarra, owner, Calmalli, Sur, B. California, Mex. Has highly auriferous and argentiferous copper ores, w steam power and 10-stamp mill.

EL TIRO COPPER CO. ARIZON

Office: 5 Nassau St., New York, N. Y. Mine office: Red Rock, Pinal C Ariz. Employs circa 80 men. Franklin B. Richards, president; Edw. B. Kort vice-president; Chas. E. Ellis, secretary and treasurer; preceding officers, Wi Grief, Clement A. Griscom, Jr., Henry G. Moore and Geo. K. Barnes, directors H. C. Smith, general manager; Louis S. Noble, consulting engineer. Organize May 22, 1907, under laws of Arizona, with capitalization $4,500,000, shares $1 par, fully issued. Bonds, $1,000,000 authorized, first mortgage, at 6%; issued $550,000. Was promoted by the American Finance & Securities Co., practically as successor of Cleveland-Arizona Mining Co. Annual meeting, third Thurs day of April.

Lands, 14 claims, 10 patented, area 250 acres, also a 5-acre millsite, in the Silver Bell district, near the Imperial mine. Property shows various contact deposits between quartz-porphyry and limestone, and there are large masses of porphyry containing disseminated chalcocite, with local segregations of oxi dized ores, the zone of oxidation being 50′ to 150′ in depth. Ores developed are cuprite, melaconite, chalcocite and chalcopyrite, with decomposed por phyritic and limestone gangue. Two ore bodies are under development, these being irregular in shape, apparently about 10 acres in combined area, and proven to depth of about 300′.

Development is by several shafts of 50′ to 400′ depth, including the 220′ Daisy shaft; 400′ Kurtz shaft and 120′ Burtis shaft, with tunnels of 750′, 430′, 350′, 250′ and 200′, there being several shorter tunnels, mine having about 6,000′ of workings, estimated to show 250,000 tons of ore, a large body of oxi dized ore on the 120′ level carrying mainly cuprite and melaconite.

Equipment includes a 600-h. p. steam plant, a 150-kw. electric plant and a 120-h. p. gasoline plant. The 600-h. p. mining plant has a 16x20″ hoist with double drum, good for 1,000′ depth, and 3 gasoline hoists. There are Nord berg and Sullivan air-compressors, of 18 drills aggregate capacity. Buildings are 18 in number, and a complete surface plant is being built.

A 50-ton concentrator, 60x60′, of wood, built 1907, for test purposes, has a 7x10″ Blake crusher, 30-ton Huntington mill, 2 rolls, 1 vanner, 5 Wilfley tables, Vezin automatic sampler, Richards pulsator and hydraulic sizer. It is planned to enlarge this mill to 250 tons, when the nature of the permanent ore bodies is fully developed. Smelting ore and concentrates will go to the Sasco smelter 10 miles distant. Property is served by the Arizona Southern railway.

In 1907 ten carloads of mine-run ore returned 7.55 to 14.6% copper, with an average of 9.92%, shipments realizing $11,390. The company plans sinking the Kurtz and Daisy shafts below the 200′ level, and doing extensive opening. No attempt has been made at regular production, but about 400 tons of 10% ore, extracted in regular development work, has been shipped to smelters at Douglas, El Paso and Kansas City, and several thousand tons of 3% ore were treated for experimental purposes, mill giving an average extraction of better than 75%.

The principal officers of the company draw salaries for their services

is proper. The argument that none of the officials are salaried is a
ne, frequently used by developing companies. There is no reason why
ial of a mining company should work for nothing, and very few do so,
ho draw no salaries usually finding their account otherwise. Property
dered promising and management good.

IUNFO CONSOLIDATED MINING CO. **MEXICO.**

ce: 28 Greene St., New York, N. Y. Mine office: Bacoachi, Arizpe,
Mex. Company gives its mine address as El Triunfo, Arizpe, Sonora,
it there is no such postoffice, and the postmaster at Bocoachi returned
addressed to this company, stating there was no such company in ex-
Bocoachi, however, apparently is the nearest postoffice point, being
miles from the company's mine. A. C. Charlott, president and general
; Dr. S. Newton Leo, vice-president; Robt. Friedman, secretary; Julius
, treasurer; preceding officers, W. B. Hunnewell and Dr. Harry Bock,
; Antoino Acuna, superintendent; Augustin Rieutard, mine superin-
John W. Ward, mill superintendent; F. E. Mansfield, smelter superin-
W. C. Albers, engineer.

pany is organized under laws of Arizona, with capitalization $2,000,000,
par. Property is held through a Mexican incorporation, capitalization
sos, shares 100 pesos par, stock of which is owned outright by El Tri-
solidated Mining Co. Annual meeting, first Monday in October.

ls, 55 pertenencias, area 136 acres, circa 10 miles southwest of Bacoa-
2 miles from the Sonora river, said to be within 4 miles of the
mine, circa 30 miles northwest of Las Chispas mine, and about 75
wagon road, from La Cananea. Company claims to have in opera-
Triunfo, Louisiana, Providencia and Esmeralda mines, with 5 ore
der development, of 2' to 5' average width, traceable 2 miles, carry-
chite, azurite, bornite, chalcopyrite and chrysocolla, all silicious, and
l native silver, with an estimated average of 5% copper, 25 to 600
and $3 gold per ton. Mine is reported as having 3,300' of workings,
3,000 tons of ore, with about 3,000 tons on the dump, stated to range
50 per ton in value. Development is by 5 shafts, 6 tunnels and various
. The main vein is a fissure of 4' to 5' width, and practically vertical
ying oxidized ores above and sulphides below.

equipment includes a 90-h. p. steam plant at the mine, and there are
ings, including dwellings. There also is a small sawmill. Wells pro-
er for boilers and potable use.

mill, of 50 tons daily capacity, has 4 Behrend tables and a 25-h. p.
gine.

smelter, ½ mile from the mine, having a 40-h. p. engine, has a 30-ton
rotary furnace, turning out matte carrying 56% copper, 600 oz. silver
oz. gold per ton. The smelter was blown in circa April, 1908, and is
have worked well, but did not remain in blast, owing to poor trans-
facilities, nearest railroad being at Cos, 38 miles distant by mule
the company hopes to get a wagon road.

company claims to have expended about $150,000, and to be out of
l stated, August, 1908, that it expected to declare a dividend in De-
but on what grounds such expectations were entertained is not readily
, as further development seems necessary to put the property on a
orily productive basis.

DE GRANDE COPPER CO. **MEXICO.**

e: care of Percy Sharpe, Nogales, Ariz. Letter returned unclaimed
mer mine office, Imuris, Magdalena, Sonora, Mex. Capitalization

$2,000,000, shares $1 par. Lands are in the foothills of the Sierra Azul, miles from Imuris, which is on the Sonora railroad. Idle.

ELY AMALGAMATED COPPER CO. NEVAD

Office: Salt Lake City, Utah. Mine office: Ely, White Pine Co., Nev. R. Murdock, president; B. F. Grant, vice-president; S. Y. Taylor, secretary a treasurer; preceding officers, J. B. Taylor and A. B. Kingsbury, directors. Ca italization $100,000, shares 10 cents par. Lands, 30 claims, in the Duck Cre district, ownership of 3 of which, lying near the Steptoe smelter, is in di pute with the Steptoe Valley Mining & Smelting Co.

ELY AMALGAMATED COPPER CO. NEVAD

Office: 407 Jackson Bldg., Denver, Colo. Mine office: Ely, White Pi Co., Nev. F. H. Harding, president; J. E. Romer, vice-president; G. A. Killa secretary and treasurer; preceding officers, Fred L. Humphrey and Mat. Root, directors. Organized November, 1906, under laws of Arizona, with ca italization $2,500,000, shares $5 par. Lands, 6 claims, area 120 acres, in t northwestern section of the Ely district. Operations confined mainly to ve lurid advertising.

ELY ARCH COPPER CO. NEVAD

Mine office: Ely, White Pine Co., Nev. Organized circa March, 1907, wi capitalization $5,000,000, shares $5 par.

ELY BELL MINING CO. NEVADA & UTA

Office: Salt Lake City, Utah. Letter returned unclaimed from form mine office, Ely, White Pine Co., Nev. F. O. McFall, president and genera manager; W. T. Binford, vice-president; J. E. Hanway, secretary and trea urer. Organized April, 1907, under laws of Arizona, with capitalizatio $1,000,000, shares $1 par. Lands, 3 unpatented claims, in the Ely district, an 15 claims, area 300 acres, in the Draper district, adjoining the Little Cotto wood district of Salt Lake county, Utah, held under bond and lease, said t show a 12′ vein. Was negotiating, late 1907, for sale of property to Corom Consolidated Mines Co.

ELY BLACKHORSE MINING CO. NEVAD

Letter returned unclaimed from former mine office, Blackhorse, Whi Pine Co., Nev. Organized 1907, under laws of Colorado, with capitalizatio $1,250,000, by M. D. McKane, et al. Is said to have a fair showing of co per ore.

ELY-BONANZA COPPER CO. NEVAD

Dead. Letters returned unclaimed from former office, 148 Broad St., Ne York, N. Y., and former mine office, Ely, White Pine Co., Nev. Francis H Sherrerd was manager. Organized 1907, under laws of New Jersey, with cap talization $1,000,000, shares $1 par. Lands were 12 claims, south of the Giro Consolidated, having a 350′ shaft, with gasoline hoist.

ELY-CALUMET COPPER CO NEVAD

Mine office: Ely, White Pine Co., Nev. A. D. Myers, manager. Capita ization $5,000,000, shares $5 par. Lands, 21 claims, said to have cost $75,000.

ELY CENTRAL COPPER CO. NEVAD

Office: 211 Keyser Bldg., Baltimore, Md. Mine office: Ely, White Pi Co., Nev. O. A. Turner, president; B. A. Hazell, vice-president; H. S. Turne secretary; E. S. S. Turner, treasurer; Fred S. Pheby, general manager; pr ceding officers and J. H. Preston, directors. Organized March 31, 1906, und laws of Delaware, with capitalization $12,000,000, shares $10 par, fully issue Was said, March, 1907, to have paid $323,000 for property. Trust Co. of Nor America, Philadelphia, registrar.

Lands, 35 claims, unpatented, area 508 acres, centrally located in t *Robinson district*, being surrounded by the Nevada Consolidated and E

lines Co., showing limestone carrying a monzonite dyke of 3,000′ claimed width, estimated to carry average values of 3% copper, 1 oz. silver and 40 cents gold per ton. Property also has an ore body of 20′ to 95′ estimated width giving assays of 2 to 17% copper, and shows native copper and chalcocite. The Weber shaft shows copper sulphides at a depth of 400′, and the company plans sinking a working shaft, and has started a tunnel planned to be driven 1,000′. The tract has been quite thoroughly tested by churn drilling, about 150 holes having been bored.

ELY CONSOLIDATED COPPER CO. **NEVADA.**

Office: 1111-25 Broad St., New York, N. Y. Mine office: Ely, White Pine Co., Nev. Willard F. Snyder, president; J. H. Everett, vice-president; Chas. O. Collingwood, secretary and treasurer; preceding officers, Col. Nicholas Luyweek and Gideon Snyder, directors; Olaus Jeldness, manager. Organized Oct. 2, 1906, under laws of Utah, with capitalization $10,000,000, shares $1 par. Windsor Trust Co., New York, registrar. Lands, 15 claims, area circa 300 acres, near the Ruth group of the Nevada Consolidated and Jupiter group of the Cumberland-Ely, bought for circa $125,000, and considered well located. The Brilliant shaft, 625′, is said to show 55′ of cupriferous pyrite on the bottom level, carrying about 3% copper and $1.50 per ton combined gold and silver values. The American shaft is 500′ and the Zack shaft 360′ deep. Shipped a little ore, 1907, carrying excess of iron, reducing smelting cost to 1 cents per ton, and netting $81.99 per ton. Property considered promising.

ELY CONSOLIDATED MINING CO. **NEVADA.**

Mine office: Ely, White Pine Co., Nev. Capitalization, $5,000,000, shares $5 par. Presumably idle.

ELY COPPER CO **NEVADA.**

Office: 815 Ernest & Cranmer Bldg., Denver, Colo. Mine office: Ely, White Pine Co., Nev. Geo. F. Fry, president; F. P. Berchy, vice-president; R. J. Grant, secretary; E. C. Newcombe, treasurer; preceding officers and F. J. Shipman, directors; Lee Lockner, engineer. Organized September, 1906, under laws of Wyoming, with capitalization $5,000,000, shares $5 par.

Lands, 7 claims, 2 fractional, area 225 acres, lying west of the Giroux Consolidated, having some open-cuts and a shaft, reported by company as 400′ deep, having a 25-h. p. hoist.

Stock in this company was placed through the General Finance Co., of Denver, on 25% commission, the fiscal agency advertising that: "The Ely copper district has been held within the clutches of the captains of finance, but by Yankee aggressiveness, the captains of industry and high finance have been thwarted, and after an outlay of vast expense we are able to burst through their phalanxes, and cut the Gordian knot that has kept the investor from obtaining even a small interest in this, the world's newest, and, without doubt, the greatest copper camp ever known since the production of copper as a commercial commodity." It would be a work of supererogation to criticise such a literary gem of purest ray serene as the foregoing excerpt, which would have been a credit to Sir Boyle Roche, though it is not on record that Sir Boyle ever turned his talents toward peddling cheap and dubious mining shares. Idle.

ELY COPPER QUEEN MINING CO. **NEVADA.**

Mine office: Ely, White Pine Co., Nev. Organized circa December, 1906, under laws of Arizona, with capitalization $1,250,000, shares $5 par by E. J. Daughters and W. J. Wallace.

ELY-COPPERTON MINING CO. **NEVADA.**

Office: 16 East South Temple St., *Salt Lake City*, Utah. Mine office: McGill, White Pine Co., Nev. *Lorenzo L. Stahl*, president; Jas. B. Taylor,

vice-president; N. Y. Stringham, secretary and treasurer; preceding offic R. B. Kingsbury and John Stringham, directors. Organized May 1, 1907, u laws of Nevada, with capitalization $100,000, shares 10 cents par; iss $60,000. Annual meeting, first Monday in February.

Lands are in the Duck Creek district, which is mainly a lead camp, property shows surface ores carrying up to 3% copper. Idle.

ELY-DUCK CREEK LEAD & COPPER CO. NEVA

Office: care of David Westwood, secretary and treasurer, Provo, U Mine office, Ely, White Pine Co., Nev. Chas. F. Ruffner, president. Organ circa December, 1906, with capitalization $50,000, shares 10 cents par. La are sundry claims in the Duck Creek district.

ELY-GIBRALTER COPPER CO. NEVA

Dead. Formerly at Ely, White Pine Co., Nev.

ELY-GIROUX EXTENSION COPPER CO. NEVAD

Office: 25 Broad St., New York, N. Y. Mine office: Ely, White Pine C Nev. Arthur U. Magnan, president; Ramón McCue, vice-president; E. B. Tu tin, treasurer; Richard Stewart, secretary; preceding officers, R. P. Russe Henry C. Haun and Zeno B. Drum, directors. Capitalization $5,000,000, shar $5 par. Lands, 130 acres, south of the Giroux Consolidated and east of t Ely Central, lands being considered fairly located. Advertised its stock o the strength of its neighbor's work, not its own. Apparently idle.

ELY GLOBE COPPER CO. NEVADA

Letter returned unclaimed from former mine office, Ely, White Pine Co Nev. C. L. Fuller, manager. Lands are in the northern part of the Ely di trict. Idle and apparently moribund.

ELY-GOLDEN LEDGE MINING CO. NEVADA & UTAH

Mine offices: Ely, White Pine Co., Nev., and Callao, Juab Co., Utah. Jo F. Schweswohl, general manager; R. N. Lesher, superintendent. Lands in clude claims at Ely, claims in the vicinity of Callao and 320 acres of plac lands on Red Hill, near Hogum. Presumably idle.

ELY-GRAND CENTRAL COPPER MINING CO. NEVADA

Office: care of S. D. Crump, president and general manager, Denver, Col Mine office: Ely, White Pine Co., Nev. Organized, 1906, under laws of Ar zona, with a capitalization $1,000,000, shares $1 par.

ELY-HERCULES MINING CO. COLORADO & NEVADA

Office: 215 Kittredge Bldg., Denver, Colo. Mine offices: Lake City, Hin dale Co., Colo., and Blackhorse, White Pine Co., Nev. Chas. T. Eckhardt president; C. C. Moon, vice-president; Geo. E. Denny, secretary and treasure Wm. Jenkins, assistant secretary; T. R. Cudahy, superintendent. Organize January, 1907, under laws of Arizona, with capitalization $2,000,000, shares par.

Colorado lands are 5 claims, on Henson Creek, and a millsite, near Lak City, having tunnels of 165′ and 258′, cutting a 3′ vein carrying ore assayin up to 40% lead, with small values in copper, silver and gold. Has sever mine buildings and is said to have been a considerable producer in the pas

The Nevada property includes 4 claims known as the Atlas group, in th Robinson district, near Ely, White Pine county, and 5 claims near Blackhors latter showing argentiferous and slightly auriferous copper sulphides. Co of lands is said to have been $12,000, and company is said to have agreed t pay $15,000 for a 51% interest therein.

ELY HIDDEN TREASURE CONSOLIDATED MINING CO. NEVADA

Mine office: Ely, White Pine Co., Nev. Capitalization $1,500,000, shar $1 par. Lands, 6 claims, having a 400′ tunnel, driven by previous owner *and a 115′ shaft*, showing ore up to 15% copper, 40% lead and $15 gold per to

ACKPOT MINING CO. **NEVADA.**
ce and mine: Ely, White Pine Co., Nev. P. J. Killcullen, president; Curran, vice-president; Eugene Cullity, secretary and treasurer; M. S. rris, general manager; preceding officers and P. Metzdorf, directors. d 1907, under laws of Arizona, with capitalization $1,000,000, shares Lands, 10 claims, area 200 acres, in the eastern portion of the Ely Presumably idle.

MBO COPPER CO. **NEVADA.**
l. Was promoted by G L. Rickard, and merged, circa 1907, in Ely Copper Co. Formerly at Ely, White Pine Co., Nev.

NG COPPER & LEAD CO. **NEVADA.**
er returned unclaimed from former mine office, Ely, White Pine Organized 1907, under laws of Utah, with capitalization, $3,000,000, l Adams, J. Norton, et al. Idle and apparently abortive.

NES CO. **NEVADA.**
. Was capitalized at $1,000,000, shares $5 par. Property sold, Aug. Consolidated Copper Co Formerly at Ely, White Pine Co., Nev.

NING CO. **NEVADA.**
r returned unclaimed from former mine office, Ely, White Pine Co., s organized, circa 1900, as a gold mining company. Lands, 13 claims, nsiderable development, showing gold ores. Has a cyanide plant. counts was under option to Hon. Thos. Kearns and David Keith.

NING & MILLING CO. **NEVADA.**
Lands sold, 1906. Formerly at Ely, White Pine Co., Nev. De- ol. VI.

PAH COPPER CO. **NEVADA.**
: 346 Commonwealth Bldg., Denver, Colo. Mine office: 10 Ely g., Ely, White Pine Co., Nev. Geo. D. Wilson, president; Jas. D. vice-president; A. M. Kearns, secretary. Organized June 28, 1907, s of Arizona, with capitalization, $2,000,000, shares $1 par. Lands, area 140 acres, known as the Modoc group, near the Vulcan-Ely, iles southeast of Ely, on which only assessment work has been done. so to have 4 claims near Goldfield, Esmeralda county, Nevada. Appar- nized mainly to sell stock.

TIONAL COPPER CO. **NEVADA.**
: 314 Century Blk., Denver, Colo. Mine office: Ely, White Pine Max Straus, president; Hon. Jas. B. Grant, vice-president; Edw. B. secretary; Thos. Keeley, treasurer; G. L. Rickard, resident manager; Murphy, mine manager; preceding officers, Henry E. Wood, A. B. and Hon. Samuel D. Crump, directors; Richard A. Parker, consulting Organized circa 1907, as successor of the Ely Jumbo, Mizpah Verde conda companies, with capitalization $5,000,000, shares $2.50 par; ,750,000.
s, 24 claims, area 480 acres, including the Cowen group of 4 claims the Nevada Consolidated on the south, property being located south- the Nevada Consolidated and immediately south of the Manhattan pper Co. At last accounts, 1907, company contemplated diamond nd sinking a shaft. Presumably idle.

VADA COPPER CO. **NEVADA.**
: 35 Wall St., New York, N. Y. Mine office: Ely, White Pine Volney D. Williamson, president; F. L. Underwood, vice-president; Bonham, second vice-president and secretary; Hamilton H. Durand, R. H. Eggleston, assistant treasurer; preceding officers, G. L. Rick- Davidson and J. *Markham Marshall, directors.* Organized May 17,

1906, under laws of Maine, with capitalization $1,000,000, shares $1 par. Trust Company of America, New York, transfer agent. Lands, 9 claims, area 17[illegible] acres, near the Cumberland-Ely, considered fairly located.

ELY NEVADA EXPLORATION CO. NEVADA.

Mine office: Ely, White Pine Co., Nev. Capitalization $250,000, shares $5 par.

ELY NORTHERN COPPER CO. NEVADA.

Office and mine: Ely, White Pine Co., Nev. Thos. B. Pheby, president; Jos. Pheby, vice-president; J. W. Biggane, secretary and treasurer; Fredk. S. Pheby, general manager. Organized May, 1906, under laws of Nevada, as successor of Nevada Northern Copper Co., with capitalization $1,000,000, shares $1 par; issued, $750,000.

Lands, 8 claims, patented, area 97 acres, adjoining the Vesta mine, said to show numerous ore bodies, of which 3, under development, are reported by company as of 15′ average width, carrying oxidized ores as replacements in limestone, of 3% copper average tenor, the zone of secondary enrichment not having been reached. Mine has about 1,000′ of workings.

ELY-OGDEN MINING CO. NEVADA.

Mine office: Ely, White Pine Co., Nev. Capitalization $1,000,000, shares $1 par.

ELY & OSCEOLA LEDGE MINING & MILLING CO. NEVADA.

Letters returned unclaimed from former office, care of North American Banking & Trust Co., Philadelphia, Pa., and former mine offices, Ely, White Pine Co., Nev., and Osceola, White Pine Co., Nev. Jos. F. Schwohl, vice-president; B. N. Lesher, superintendent. Lands, 9 lode claims, area circa 180 acres, at Ely, and 8 placer claims, area 320 acres, at Osceola. Employed about 25 men, late in 1907. Idle.

ELY-PHOENIX COPPER MINING CO. NEVADA.

Dead. Organized circa 1907, with capitalization $1,000,000, shares $1 par. Formerly at Ely, White Pine Co., Nev.

ELY-RAND COPPER CO. NEVADA.

Mine office: Ely, White Pine Co., Nev. Organized 1907, under laws of Arizona, with capitalization $2,000,000, by Alfred Adams, Norton Adams and Hunter B. Supple. Presumably idle.

ELY-RESURRECTION COPPER CO. NEVADA.

Office: Herald Bldg., Salt Lake City, Utah. Mine office: Ely, White Pine Co., Nev. C. Freed, president; Jos. Lippman, vice-president; Frank Knox, treasurer; C. R. Raymond, secretary and manager; preceding officers T. Jacobson, G. W. Lynch and Wm. L. Moyer, directors. Organized 1906 under laws of Arizona, with capitalization $1,000,000, shares $5 par. Lands, 30 claims, patented, area circa 550 acres, lying north and east of Ely and considered promising, though somewhat out of the center of the district. Mine has 2 short tunnels and a 140′ shaft, showing 18′ of ore assaying up to 5% copper, with gold and silver values. Also has some high grade ore assaying up to 46% lead and 110 oz. silver per ton, with good gold values.

ELY REVENUE COPPER CO. NEVADA.

Office: Durango, Colo. Mine office: Ely, White Pine Co., Nev. C. E. McConnell, president. Organized circa January, 1907, with capitalization $1,000,000, shares $1 par. Lands, known as the Revenue group, are near the Chainman and Altman mines.

ELY-ROCHELLE COPPER CO. NEVADA.

Mine office: Ely, White Pine Co., Nev. Organized Nov. 23, 1906, under *laws of Maine*, with capitalization $1,000,000, shares $1 par.

SILVER, LEAD & COPPER CO. **NEVADA.**
Office: Whinery Blk., Union, Iowa. Letter returned unclaimed from mer mine office, Ely, White Pine Co., Nev. H. J. Benson, president; R. Sixby, vice-president; E. A. Corfe, secretary; F. K. Long, treasurer; C. R. cr, general manager; preceding officers, J. D. Cundiff and A. R. Bavender, ctors. Lands, 9 claims, area circa 180 acres, having several shallow shafts short tunnels, said to have produced a little silver-lead ore in the past.

STANDARD COPPER CO. **NEVADA.**
Office: care of W. F. Snyder, Salt Lake City, Utah. Letter returned laimed from former mine office, Ely, White Pine Co., Nev. Organized ca January, 1907. Lands, circa 1,000 acres. Idle.

SULPHIDE COPPER CO. **NEVADA.**
Mine office: Ely, White Pine Co., Nev. Organized 1907, with capitaliza- n $1,000,000, shares $1 par.

LY WANETA MINING & MILLING CO. **NEVADA.**
Letter returned unclaimed from former mine office, Ely, White Pine Co., ev. Organized circa March, 1907, to operate in vicinity of Ely. Idle and pparently moribund.

LY WESTERN COPPER CO. **NEVADA.**
Mine office: Ely, White Pine Co., Nev. Organized July, 1906, with apitalization $1,000,000, shares $1 par. Lands, 40 acres. Presumably idle.

LY-WILDHORSE COPPER CO. **NEVADA.**
Letter returned unclaimed from former mine office, Ely, White Pine e., Nev. Organized circa February, 1907, to develop a group of about 18 aims, in the vicinity of Pilot Knob. Idle and apparently moribund.

LY-WITCH COPPER CO. **NEVADA.**
Office: 1204-32 Broadway, New York, N. Y. Mine office: Ely, White ine Co., Nev. J. E. Bamberger, president; D. M. Hyman, vice-president; L. Tilton, secretary; Ernest Bamberger, treasurer and general manager; receding officers and W. W. Armstrong, directors; L. D. Osborne, superintend- nt. Organized Nov. 22, 1906, under laws of Maine, with capitalization 5,000,000, shares $5 par.

Lands, 7 claims, 1 fractional, area 54 acres, patents applied for, said to ave been bought for $275,000, lying in the porphyry zone between the evada Consolidated and Cumberland-Ely mines, showing large blowouts f ferruginous porphyry. Development is by a 300′ shaft, with levels at 100′ ntervals, and by tunnels of 1,200′, 600′ and 1,050′, with 3,500′ of workings, howing ores, mainly chalcocite and chalcopyrite, assaying up to 25% copper nd 2 oz. silver per ton, with traces of gold. Equipment includes a second- ation hoist, good for 500′ depth, and 5 small mine buildings. Property has ome good ore on the dumps, and is well located between the Wedge group f the Cumberland-Ely and the Ruth mine of the Nevada Consolidated.

MERALD COPPER CO. **MEXICO.**
Mine office: Llano, Magdalena, Sonora, Mex. F. C. Emery, president; W. D. Fredericks, superintendent. Lands, 88 hectares, on which develop- ment, begun January, 1907, shows ore assaying 10 to 25% copper, 15 to 20 oz. silver and up to $6 gold per metric ton, silver values increasing with depth.

MERALD MINING CO. **WYOMING.**
Office and mine: Wheatland, Laramie Co., Wyo. H. A. Robinson, man- ager. Lands, including the Cooney Hill and Emerald mines, on Slate Creek, show a prominent gossan. The Emerald has a 60′ shaft in ore, and a 100′ shaft bottomed in a gossan showing *traces of copper* sulphides.

EMERALD MINING & SMELTING CO. MEXIC

Dead. Succeeded by Esmeralda Copper Mining & Smelting Co. Fo merly at Santa Catarina del Norte, Baja California, Mex.

EMMA COPPER CO. UTAH

Office: care of E. O. Howard, secretary and treasurer, Salt Lake Cit Utah. Mine office: Alta, Salt Lake Co., Utah. John A. Kirby, president Joseph Lippman, vice-president; E. O. Howard, secretary and treasurer; pr ceding officers, W. M. Wantland, D. H. Peery, Rufus K. Cobb, S. A. Bang and L. D. Gordon, directors; Jas. E. Beveridge, superintendent. Organize circa November, 1906, under laws of Utah, with capitalization $1,000,00 shares $1 par. Is no relation to the Old Emma Mining Co. Lands, 8 claim area 160 acres, with bond and lease on 3 adjoining groups, near the Colum bus Consolidated. Property is the old Emma mine, which was a considerabl producer in early days, and is said to have been the first mine opened i Utah, with claimed production of about $5,000,000. Development is throug the Flagstaff tunnel, showing a 15' vein, carrying a paystreak of 1' to 4' widt giving assays of 2.5% copper, 11.8% lead, 40 oz. silver and 83 cents gold p ton. Property considered promising.

SOCIEDAD MINERA EMMA LUISA. CHILE

Mine office: Taltal, Antofagasta, Chile. J. S. Marion, superintendent at last accounts. Has auriferous copper ores, with steam power. Idle.

EMMA MINE. BRITISH COLUMBIA

Owned three-fourths by the British Columbia Copper Co., Ltd., and one fourth by the Hall Mining & Smelting Co., Ltd., and is described under title of former.

EMMA MINE. MONTANA

Held by Butte Copper & Zinc Co. at last accounts. Changes hands so frequently it is difficult to keep track of.

EMMA MINE. NEW MEXICO

Mine office: Santa Rita, Grant Co., N. M. Property, owned by Phelps Dodge & Co., is under lease to P. C. Cramer, who was producing 2 to 3 car loads of ore weekly, at last accounts.

EMMA MINING & DEVELOPMENT CO. MONTANA

Dead. Formerly at Butte, Silver Bow Co., Mont.

GEWERKSCHAFT EMMANUEL. GERMANY

Letter returned unclaimed from former mine office, Wülfrath, Rhein provinz, Prussia, Germany. Mine, opened by one shaft, has chalcopyrite an sphalerite.

EMPIRE COPPER CO. IDAHO

Office: 52 William St., New York, N. Y. Mine office: Mackay, Custe Co., Ida. Frank M. Leland, president, treasurer and general manager; John H. Hobbs, vice-president; Robt. Leslie Moffett, secretary; preceding officers John C. Montgomery and Thos. J. Barbour, directors; Ralph R. Osborn, mine superintendent; Timothy E. Guhin, smelter superintendent; Frank L. Sweeney, master mechanic; A. F. Wuensch, consulting engineer.

Organized May 29, 1907, under laws of Maine, with capitalizatio $6,000,000, shares $5 par, reduced, July 16, 1908, to $1,200,000, shares $1 pa issued, $1,000,000. On Jan. 1, 1908, had quick assets of $32,997.42, includin $18,060.65 cash, with liabilities of only $389.58. Annual meeting, third Tu day in May.

Company bought the Mackay property of the White Knob Copper Development Co., Ltd., taking over also a 5-year lease on the property fro the MacBeth Leasing Co., giving 250,000 shares of stock to the White Kn *and 750,000 shares* to the owners of the MacBeth lease, and begun busine

out any cash in the treasury, but with 200,000 shares of stock. Quick ts now possessed have been secured from earnings, in addition to the in- lation of new machinery costing $7,735.69.

Lands, 39 claims, 6 fractional, 6 patented, area 700 acres, also mill and lter sites of 184 acres, and a railroad right-of-way, in the Alder creek dis- t. Property carries a large number of lenticular contact deposits, between ite-porphyry and limestone, of which 31 are more or less developed, these g erratic in size, strike and dip, carrying all of the ordinary copper oxides, bonates and sulphides. Former owners claimed a 23' vein carrying 3 to 9% per and $1.75 to $3 combined gold and silver values per ton, but present own- merely claim what they have, and give the average of one year's ore extrac- n as 3.9% copper, 2.02 oz. silver and 80 cents gold per ton. The property was ned circa 1884, and worked at various times. For some years it was der the control of a succession of White Knob corporations, which suc- ded each other with deadly monotony, each making a flat failure of the ne, until the property was leased, circa July 1, 1905, to the MacBeth Leas- g Co., which worked the mine on a business basis, at a profit, which the owners never succeeded in doing.

The mine has a glory-hole of 125' to 200' width, but extraction is mainly tunnel, the main shaft of 700' depth connecting with the Albert tunnel, circa 1,500' length, the mine having about 7 miles of workings, estimated show 60,000 tons of ore, with 30,000 tons blocked out for stoping. The ine is dry.

Equipment includes steam, electric, gasoline, water and air power, with total of 152 h. p. at the mine and 125 h. p. at the smelter. There are h. p., 10-h. p. and 8-h. p. hoists, and an 8-drill air-compressor. The com- ny has about 20 buildings at the mine, including a sawmill, 20x30' carpen- shop and 20x30' smithy, with a 40x100' machine-shop at the smelter.

The mine is reached by a 96-mile branch of the Oregon Short Line rail- y, running from Blackfoot to Houston, and is connected with the smelter y the Empire railroad, owned by the company, 7¾ miles in length with 36" ge, equipped with two 23-ton Shay mountain climbing locomotives, and 38 rs. The line has a maximum gradient of 6%, with a rise of 2,000', and has 6% grade on a 34° curve.

The smelter has two 125-ton water-jacket blast-furnaces 44x160" at the ayers, with Connersville blowers, making matte carrying about 40% copper, oz. silver and 1 oz. gold per ton, sent to the Murray smelter for conversion, and does occasional custom smelting. The mine also has shipped some ore the Garfield smelter.

Production, 1906, under the old management, was circa 3,200,000 lbs. fine pper, and, for 1907, was 2,750,000 lbs., from 42,800 tons of ore treated. ining costs are about $3 per ton, and smelting costs $4.25, the gold and ver values about offsetting conversion and refining costs, giving copper at average cost of about 10 cents per pound.

The Empire Copper Co. was promoted just in time to be caught in the 07 panic, but every share of stock sold to the public was redeemed, at sub- scription price, for which the promoters deserve great credit. The property considered valuable, notwithstanding its bad record under the various White Knob companies. The present management is efficient, and probably will resume operations shortly, only a few men being employed, doing assess- ment work on unpatented claims, in October, 1908.

EMPIRE COPPER CO. **NEVADA.**

Dead. Lands now held by Pacific Consolidated Mining Co. Formerly at Reno, Washoe Co., Nev.

EMPIRE COPPER & GOLD MINING CO. ARIZO

Office: 217-122 West Third St., Los Angeles, Cal. Mine office: John
Cochise Co., Ariz. J. L. Brooks, president and general manager; M. J. G
vice-president; H. H. Morrow, secretary and treasurer; preceding offic
J. O. Pace, H. Hermanson, Angus Graham and M. M. Gustin, directors.
ganized Jan. 31, 1905, under laws of Arizona, with capitalization $1,500,
shares $1 par. Annual meeting, second Monday in January. Lands,
claims, area 480 acres, in the Little Dragoon Mountains, in 2 groups, incl
ing the Empire group of 16 claims, and the Cowboy group of 8 claims,
miles from Johnson. Lands show a good gossan carrying carbonate stain
Has 2 shafts, one a 2-compartment 400′ shaft, with about 500′ of drifts, sho
ing ore of 3.4% copper tenor on the 100′ level, with some ore assaying up
30% copper, 4 oz. silver and $2.80 gold per ton. Has a hoist good for 1,00
depth, and an air-compressor.

EMPIRE COPPER MINING & MILLING CO. NEW MEXIC

Mine office: Tusas, Rio Arriba Co., N. M. Property, known as the
S. P. mine, has a shaft showing copper ore of fair grade.

EMPIRE-GOLD BUG MINING CO. COLORADO

Dead. Formerly at Empire, Clear Creek Co., Colo.

EMPIRE GOLD & COPPER CO. COLORADO

Office and mine: care of Harry W. Kane, Central City, Gilpin Co., Col
Organized 1907, under laws of Colorado, with capitalization $1,500,000. Land
include the Aduddell group and the Jimtown millsite. Has a 200-ton reduc
tion plant, at Idaho Springs. Production is partly through the Aduddel
shaft, and partly through the Newhouse tunnel.

EMPIRE MINES CO. NEW MEXICO

Dead. Formerly at Hanover, Grant Co., N. M.

EMPIRE MINING CO. ARIZONA

Office: Utica, N. Y. Mine office: Bisbee, Cochise Co., Ariz. W.
Scott, president; A. W. Daggett, treasurer; J. G. Pritchard, managing direct
preceding officers, R. E. King, F. L. Guillame, L. E. Browne, W. A. Fenn, J
A. Losse and F. M. Penny, directors; Alex. Erickson, superintendent. Organ
ized June 27, 1904, under laws of Arizona, with capitalization $1,000,00
shares $1 par.

Lands, 10 claims, area 200 acres, near the Modern mine, opened by
350′ tunnel, claimed to show a 5′ vein of auriferous and argentiferous copp
ore, of circa $14 per ton gross value. Ore is found in small stringers, typic
of this district, and property is not considered well located.

EMPIRE MINING CO. ARIZON

Mine office: Pantano, Pima Co., Ariz. E. A. Pike, superintendent.
supposed to be controlled by Col. Epes Randolph and associates. Mine, f
merly known by the Total Wreck, made small ore shipments, 1908, to th
smelter at El Paso.

EMPIRE MINING CO. MICHIGA

Dead. Lands sold, 1905, to Keweenaw Copper Co. Formerly at Delawa
Mine, Keweenaw Co., Mich.

EMPIRE-NEVADA COPPER MINING & SMELTING CO. NEVAD

Office: 29 Broadway, New York, N. Y. Mine office: Yerington,
Co., Nev. Wm. Gelder, president; L. R. Bittman, secretary. Organized und
laws of Arizona, with capitalization $5,000,000, shares $5 par. Lands, 6
500 acres, 2 miles west of Yerington, having numerous pits and 4 shafts
about 100′ depth each. Considerable drilling has been done. Company clai
an outcrop of red copper ore more than 1,000′ wide, which seems an unde

mistic statement. Is said to have a 200-ton mill and a 100-ton smelter, statement not verified. Presumably idle.

IRE SMELTING CO. **ARIZONA.**

Dead. Property sold, under foreclosure, Sept. 15, 1906, to Walter F. , for $16,193. Formerly at Benson, Cochise Co., Ariz.

IRE & STAR MINING, MILLING & SMELTING CO. **WYOMING.**

Dead. Succeeded by Hecla Mining Co. Formerly at Hecla, Laramie Co.,

RE STATE MINING CO. **ARIZONA.**

ead. Succeeded by Empire Mining Co. Formerly at Bisbee, Cochise riz.

RE TUNNEL & GOLD MINING, MILLING & RANSPORTATION CO. **COLORADO.**

ice: Georgetown, Colo. Mine offices: Empire, Clear Creek Co., Colo., adville, Lake Co., Colo. Frank A. Maxwell, president and manager; e Jarbeau, secretary. Property includes the Empire tunnel and gold at Empire, and the Cloud City mine, at Leadville, carrying auriferous gentiferous copper and lead sulphides. Has water power at Empire, eam power at Leadville. Has a 50-ton concentrator, employing circa

ESS MINING CO. **ARIZONA.**

ad. Merged in Great Belcher of Arizona Co. Formerly at Belcher, i Co., Ariz.

MPMENT BOSS MINING & MILLING CO. **WYOMING.**

ed. Was organized September, 1906, under laws of Wyoming, prop- ing the Boss group, adjoining the Itmay. Formerly at Encampment, Co., Wyo.

MPMENT MINING CO. **WYOMING.**

ad. Lost lands, 1903. Formerly at Encampment, Carbon Co., Wyo.

NITAS COPPER & SMELTING CO. **CALIFORNIA.**

ne office: Encinitas, San Diego Co., Cal. J. Andrew Wauchope, tendent. Supposedly has a concentrator. Presumably idle.

NITO COPPER CO. **CALIFORNIA.**

ad. Was succeeded, circa 1905, by Encinitas Copper & Smelting Co. ly at Encinitas, San Diego Co., Cal.

LS COPPER MINING CO. **CALIFORNIA.**

ice: 421 Market St., San Francisco, Cal. Mine office: Taylorsville, Co., Cal. Lands, in Light's Cañon, 3 miles northeast of Taylorsville, ng the Superior mine, have a crosscut tunnel running into Iron Cap ain, showing sulphide, carbonate and silicate ores, assaying well in gold and silver.

ISH & AUSTRALIAN COPPER CO., LTD. **AUSTRALIA.**

ice: 17 Gracechurch St., London, E. C., Eng. Works offices: Port de, South Australia, and Waratah, Newcastle, N. S. W., Australia. Harvey, chairman; Wm. Owen Robinson, deputy chairman; preceding , W. S. Cuff and W. Russell, directors; G. E. C. Clarke, secretary; F. S. , general manager; Thos. Johnson, smelter superintendent. Organized and reorganized March 15, 1864, under laws of Great Britain, with limited reduced to £150,000, shares 30s. par; issued, £102,988 10s. De- es, £25,000, at 6%, due January, 1912. Dividends have been as fol- 6d. in 1901; 1s. each in 1902, 1903, 1904, 1905, 1906 and 1907. Net were £4,210 in 1906 and £4,055 8s. 6d. in 1907.

roperty includes smelting works at *Waratah and* Port Adelaide, em- g circa 100 men, *also an interest of 3,904* shares in the Clara St. Dora

Copper Mining Co., principal value of latter being in the way of suppl... ore to the smelters.

ENTERPRISE COPPER MINING CO., N. L. AUSTRA...

Mine office: Barossa, South Australia. Lands, freehold, 2 miles from Williamstown, have a 4′ quartz vein, with footwall paystreak of 6″ to 8″ carrying melaconite, malachite and chalcopyrite, all with good silver values, opened by a 200′ main shaft. Has steam power and a hoist. Property was worked, many years ago, then shipping a little ore of 40 to 50% copper ten...

ENTERPRISE MILL & MINING CO. COLORADO.

Dead. Was succeeded by Enterprise Mining Co., which was merged, circa 1907, in the Swarthmore Consolidated Mining Co. Formerly at El... rado, Boulder Co., Colo.

ENTERPRISE MINING CO. NEVADA

Letter returned unclaimed from former mine office, Tonopah, Nye Co., Nev. At last accounts was prospecting a property in the Lone Mountain district, circa 16 miles southwest of Tonopah, having an 86′ shaft showing vein of 4′ to 8′ width, giving average assays of $12 to $60 per ton in gold, silver and copper. Presumably idle.

ENTERPRISE MINING & MILLING CO. NEW MEXICO

Office: care of W. B. DeShon, secretary and treasurer, Pittsburg, Pa. Mine office: Cooney, Socorro Co., N. M. Geo. A. Freeman, vice-president and general manager. Lands, 2 claims, known as the Kat and Kittens, also the Enterprise group, having a 130′ shaft showing a 4′ ore body and a 200′ shaft bottomed in a 10′ vein carrying values mainly in gold. Has a 150-light electric plant. A 25-ton concentrator and 50-ton cyanide plant were burned June, 1908, at an estimated loss of $33,000, with $20,000 insurance.

ENTERPRISE MINING, REDUCTION & IMPROVEMENT CO. ARIZONA

Office and mine: Kingman, Mohave Co., Ariz. Maj. W. A. Mensch, president, treasurer and general manager; M. L. Summers, vice-president; S. A. Mensch, secretary; preceding officers, J. N. Turrentine, F. M. Townsend, Arthur Gleason and E. E. Engeart, directors. Organized July 15, 1900, under laws of Arizona, with capitalization $1,500,000, shares $1 par; issued $1,165,000. Annual meeting, first Tuesday after first Monday in January.

Lands, 15 claims, area 300 acres, in the Maynard district of the Hualapai Mountains, adjoining the Arizona Le Roy Copper Mining Co., circa 30 miles southeast of Kingman and about 13 miles from the Santa Fé railroad, with good wagon road connecting, lands being well watered, with timber available. Property shows 7 ore bodies, in granite and porphyry, one, under development known as the American vein, being estimated at 30′ average width, opened by a 200′ shaft, with 1,410′ of workings, estimated to show 70,000 tons of ore with 40,000 tons blocked out, carrying bornite, chalcopyrite and tetrahedrite averaging 7% copper, 25% lead and 206 oz. silver, and from $4 to $8 gold per ton, which estimates are unduly high. Has a 35-h. p. steam plant, with mine buildings. Company plans continuous development.

EPHIA MINING CO. MEXICO

Office and mine: Douglas, Cochise Co., Ariz. W. F. Nihart, general manager. Organized 1906, under laws of Arizona, with capitalization $500,000, shares $1 par. Lands, circa 20 miles from a railroad, are in the Nogal-Carrizo district of Arizpe, Sonora, Mexico. Has an 80′ shaft, showing ore assaying up to 27.5% copper and 55 oz. silver per ton. Presumably idle.

EQUATOR MINING & SMELTING CO. ARIZONA

Office: 49 Wall St., New York, N. Y. Mine office: Jerome, Yavapai Co., Ariz. Hon. Wm. A. Clark, president; Jas. A. Macdonald, vice-president; Hart H. St. Clair, secretary and treasurer; preceding officers, Chas. W. Clark and

Jas. H. Anderson, directors. Organized March 19, 1900, under laws of West Virginia, with capitalization $500,000, shares $5 par; issued, $275,000. Annual meeting, third Monday in February.

Property, commonly known as the Iron King mine, is on Equator Hill, in the Agua Fria district, south of Jerome, 4 miles by trail or 6 miles by wagon-road. Property shows a mineralized zone up to 600' in width, with north and south strike, traceable for upwards of 1,000'. It was feared that the ore body was a blanket vein, but diamond drill borings proved it to hold to depth, carrying auriferous and argentiferous copper ores. Mine has a 300' main shaft, and a 5,000' gravity tram-line connecting the portal of the upper tunnel with the roast-yard of the reduction plant.

Property had a 250-ton smelter, and production, 1904, was circa 800,000 lb. fine copper, but operations were suspended August, 1905, smelter dismantled and machinery removed.

EQUITABLE COPPER CO. **WYOMING.**

Office: Altoona, Pa. Letter returned unclaimed from former mine office, Encampment, Carbon Co., Wyo. A. Brile, president; Geo. W. McWilliams, secretary and general manager; A. L. Ritchie, superintendent. Organized 1901. Lands, 9 lode claims, area 180 acres, and 320 acres of placer claims, known as the Mountain View group, between Battle Creek and Roaring Fork, near the Itmay mine, showing a vein in limestone with gossan capping, opened by a 50' shaft. Has a 30-h. p. steam plant and several mine buildings. Presumably idle.

EQUITY COPPER & GOLD MINING CO. **OREGON.**

Office: care of Rev. W. J. Hughes, president and general manager, Baker City, Ore. Mine office: North Powder, Union Co., Ore. F. M. Saxton, vice-president; Kate Palmer, secretary; G. J. Bowman, treasurer; preceding officers, with L. Hughes, H. A. Kenyon, R. W. Hughes, J. Hamilton Smith and R. T. Roberts, directors. Capitalization $150,000. Lands, 8 gold claims, in the Sumpterburg district of Grant County, and 10 copper claims, known as the Equity group, circa 6 miles from North Powder, having a 200' crosscut tunnel.

ERIE & COLORADO COPPER CO. **COLORADO.**

Office: care of Henry Tibbals, secretary and treasurer, Erie, Pa. W. A. Walker, president; Ernst Behrend, vice-president. Lands, 160 acres, patented, somewhere in Boulder County, Colorado, slightly developed and presumably idle.

ERIE CONSOLIDATED MINING & REDUCTION CO. **MICHIGAN.**

Dead. Name changed from Wahnita Copper Co. Both fraudulent. Formerly at Matchwood, Ontonagon Co., Mich.

ERIE COPPER MINING CO. **UTAH.**

Dead. Formerly at Milford, Beaver Co., Utah. Fully described Vol. VI.

ERIEGA COPPER & COAL MINING & SMELTING CO. **MONTANA.**

Dead. Formerly at Bozeman, Gallatin Co., Mont. Fully described Vol. VI.

ERIE-ONTARIO DEVELOPMENT CO. **MICHIGAN.**

Office: 60 State St., Boston, Mass. Mine office: Winona, Houghton Co., Mich. H. F. Fay, president; Geo. G. Endicott, vice-president; Jas. Chynoweth, superintendent. Organized January, 1905, with capitalization $50,000, shares $10 par, fully paid.

Lands, 640 acres, held under option, including the old Erie and Ontario mine, midway between the Champion and Winona mines. The tract shows a copper lode, supposedly a continuation of the Baltic amygdaloid, opened by a 60° shaft, sunk at 68°, running into the hanging wall, which shows a bed of about 25' width, carrying considerable *epidote, but little* copper. Machinery includes a 500' *hoist and 4-drill air-compressor, and* some diamond drilling

was done, 1907, from the bottom of the shaft. Operations suspended by reason of lack of funds.

COMPAÑIA MINERA ESCUADRA, S. A. ME

Mine office: Ocotlán de Morelos, Oaxaca, Mex. Thos. A. Ha manager. Has good silver and copper ores, latter being practically product only. Employs about 150 men.

ESCURIAL COPPER MINES, LTD. S

Offices: 4 Union Court, London, E. C., Eng., and Pelayo, 2, Bar Spain. Mine office: Calmenarijos, Madrid, Spain. Jas. Taylor, cha Joaquin Lorena, mine manager; Henry N. Gardiner, secretary. Org Oct. 17, 1901, under laws of Great Britain, with capitalization £125,000, £1 par; issued, £109,177. Lands, 342 acres, held under perpetual leas the Spanish Government, including the Gloria, Ramón, Jaime and N Señora del Pilar mines. Work is confined to the latter, which shows bodies and was worked by the ancients, either Romans or those who pr them, to a depth of 135', by 3 shafts, with several drifts. Sundry smal ments of selected ore from the Pilar mine have given returns of 7.73 to 2 copper. Property considered promising.

NEGOCIACIÓN MINERA ESMERALDA. ME

Mine office: Chalchihuites, Sombrerete, Zacatecas, Mex. Leopold dero, manager. Property includes the Anaconda, Esmeralda and L mines, developed by shafts and tunnels, and producing argentiferous and erous lead and copper ores. Employs about 75 men.

COMPAÑIA MINERA ESMERALDA DE COLLAHUASI. C

Office: Iquique, Chile. Mine office: Collahuasi, Tarapacá, Chile. ized Dec. 21, 1905, under laws of Chile, with capitalization 200,000 shares 100 pesos par.

ESMERALDA COPPER CO. NEV

Dead. Lands were circa 100 acres, vein carrying argentiferous and erous copper ore of good average tenor, being proven, at intervals, by ing, for a distance of circa 4,500', having 4 shafts, deepest 74'. Forme Luning, Esmeralda Co., Nev.

ESMERALDA COPPER MINING & SMELTING CO. ME

Mine office: Santa Catarina del Norte, Baja California, Mex. Fr Burns, superintendent. Mine, known as La Esmeralda, is opened by with considerable development, and shipped some ore previous to 1902. sumably idle.

ESMERALDA COPPER PRECIPITATING CO. ARIZ

Dead. Formerly at Ryan, Coconino Co., Ariz. Described Vol. VII.

ESMERALDA MINE. AUSTR

Mine office: Rockley, N. S. W., Australia. Has a 100' shaft, with of circa 10' width, carrying ore averaging 8 to 10% copper tenor.

ESPAÑOLA COPPER SYNDICATE, LTD. S

Office: St. Helen's Place, London, E. C., Eng. Stanlake Lee and Marshall, joint managers. Organized Jan. 6, 1906, under laws of Great ain, with capitalization £500, shares 1s. par, fully issued. Proper province of Huelva, Spain, formerly owned by Spanish Minerals Develo Ltd., is supposed to have been sold to Esperanza Copper & Sulphur Co.

SOCIEDAD MINERA ESPAÑOLA DEL NORTE DE ESPAÑA. S

Mine office: Herrera de Rio Pisuerga, Palencia, Spain. Don Fe *Villanueva*, president. Organized 1902. Lands include various conc *carrying coal*, iron and copper. Presumably idle.

MPAÑIA MINERA ESPERANZA y CONSTANCIA. **MEXICO.**

Mine office: Sierra Mojada, Monclova, Coahuila, Mex. Guillermo Hage-an, manager. Operates La Fortuna and San Antonio mines, former opened a 350′ shaft, equipped with steam power. Has argentiferous lead and copper s. Employs about 75 men.

SPERANZA COPPER CO. **ARIZONA.**

Office and mine: Tucson, Pima Co., Ariz. M. G. Samaniego, president; rturo M. Elias, vice-president; H. C. Young, secretary; Francis M. Hartman, easurer and manager. Capitalization $600,000, shares $1 par. Lands, 6 ims, area 90 acres, known as the Esperanza group, 35 miles from a rail-ad, in the Cañada del Oro district, Catalina Mountains, developed by about ,000′ of workings, greatest depth 75′, showing carbonate and sulphide cop-r ores.

SPERANZA COPPER & SULPHUR CO., LTD. **SPAIN.**

Office: 74 Palmerston House, London, E. C., Eng. Mine office: Almonás-r, Huelva, Spain. Robt. J. Price, M. P., chairman; Jos. Pasfield, secretary; dlie & Pringle, consulting engineers. Organized Feb. 14, 1906, under laws f Great Britain, with capitalization £350,000, shares £1 par, as successor of panish Minerals Development Co., Ltd. Debentures, £100,000, at 5%, re-deemable not later than 1916, at 110, by annual drawings of 20% of profits.

Lands, 476 acres, known as the Esperanza group, carrying cupriferous yrites, circa 40 miles from Huelva, property including the Esperanza and Angostura mines, which are the most developed, also the Nueva, Mosquitos, Forzosa, Santo Tomás and Palmira mines. Some of these properties have been worked from very ancient times, mainly on a very small scale, showing characteristic narrow Roman shafts, with footholes alternately on either side for ingress and egress of miners.

The Esperanza mine is estimated to show circa 100,000 tons of ore of all grades, averaging 40.5% sulphur. There also is considerable ore developed by the Forzosa and San Esteban tunnels. Ore is divided into three classes, the lower grade carrying mainly sulphur values.

A railroad is building to pass the eastern end of the property, and the company is constructing a narrow-gauge line to connect therewith. Production, 1907, was circa 50,000 long tons of ore, and, for the first nine months of 1908, was 38,840 tons. Production of fine copper, 1907, is estimated at 1,200,000 lbs. Property is considered promising.

SPERANZA MINING CO. **MEXICO.**

Office: care of W. R. Nicholson, president, Land Title Bldg., Philadel-hia, Pa. Mine office: Ensenada, Norte, Baja California, Mex. Geo. P. Brown, general manager; Harold Playter, superintendent; D. A. Conolly, smelter superintendent. Lands, 83 pertenencias, also 40 acres miscellaneous claims, on Cedros Island, on the west coast. Country rock is diorite, showing particular ore bodies, carrying carbonate and sulphide ores, estimated by company to average 40′ width, 300′ depth and 1,100′ length, and to contain an average of 2.5% copper, 3% zinc, 2 oz. silver and $3.50 gold per ton. Mine has been extensively developed, having about 8,500′ of workings, showing circa 150,000 tons of low-grade ore, with about 100,000 tons blocked out for stoping. Property was opened 1891, closed 1901, reopened 1905. Surface ores change to basic copper ores at depth. Property has produced about $500 in values, from shipment of high-grade ores to smelters at Denver, to San Francisco and Tacoma. A reduction plant started at the mine aimed to have a 50-ton blast-furnace, to turn out matte carrying about copper, 6 oz. silver and 1.5 oz. gold, to be sent to Tacoma for refining.

Fuel at smelter is coke, costing $18 per ton. Production, 1905, 275,000 lbs. fine copper. Presumably idle.

MINAS ESPARANZA y VISITACION.

Mine office: Albarracín, Teruel, Spain. D. Santiago Maora Property is sundry iron mining lands, on which a promising lense ore was discovered, 1903. Presumably idle.

ESPIE BAY MINES DEVELOPMENT SYNDICATE, LTD. TURKEY

Dead. Voluntarily wound up, June, 1904. Formerly at Terebo zond, Turkey in Asia.

JOSÉ RAMÓN ESPINOZA.

Office and works: Petorca, Aconcagua, Chile. Mine office: La Petorca, Aconcagua, Chile. Works office: Pedegua, Petorca, A Chile. Lands include Las Reices mine, 60 meters deep, which in duced 537 metric tons of ore of 13% copper tenor, and La Louisa meters deep, which, 1903, produced 300 metric tons of 5% copper ore. copper, made by leaching mine waters, also is produced, in small q Mines, slightly developed, show large quantities of low grade ore, able commercially until railroad transportation, now lacking, is secu

Has 2 smelters, El Cantarito at Petorca, and El Hueso at Ped Fundicion Cantarito, 13 miles north of Cabildo, has 1 reverberato blast-furnace, burning wood, at cost of 6 pesos per metric ton, near of wood being required to smelt 1 ton of mineral, producing Chil 90% tenor, with slags averaging 1% copper. Works about half time ing circa 40 men when running, at average wages of 1 peso daily.

El Fundicion Hueso, at Pedegua, 24 kilometers north of the rai tion at Cabildo, has a single reverberatory furnace, burning wood, e when working, circa 50 men, at average wages of 1 peso daily. In of a blast-furnace is contemplated. Production, 1903, was 264,243 po copper.

ALEXANDER ESQUER y CA.

Mine office: Baroyeca, Alamos, Sonora, Mex. J. J. Esquer, Property is the Mexicana, Esperanza and other mines, developed and tunnels, carrying auriferous and argentiferous copper ores.

ESSEX COPPER CO. MI

Office: care of Marmaduke Richardson, president, 12 John York, N. Y. Alfred Meads, agent. Lands, which included the old Norw Ontonagon county, Michigan, were sold, circa 1901, and company liquidated. Paid $1 per share, 1906, and a further dividend is to be pa

ESTERBROOK MINING CO. W

Office and mine: Douglas, Converse Co., Wyo. Geo. W. Meter dent; John Foxton, secretary and treasurer. Organized 1897, under Wyoming, with capitalization $10,000; reorganized Sept. 9, 1903, w talization $1,000,000. Lands, 120 acres, also 120 acres miscellaneous Albany county, Wyoming, about 40 miles south of Douglas, show fissure vein, in country rocks of diorite, schist and granite, giving 2 to 4% copper, 25 to 30% lead, 2 to 4 oz. silver and $1 to $2 gold from cerussite, galena, cuprite and chalcopyrite. Has 2 short tunn shafts, deepest 284'.

ESTEY MINING & MILLING CO. NEW

Dead. Succeeded, circa 1902, by Dividend Mining & Milling merly at Estey, Socorro Co., N. M.

NUEVA SOCIEDAD PROPRIETARIA LA ESTRELLA.

Dead. **Formerly at Los Martires, Granada, Spain.**

IEDAD GRANADINA LA ESTRELLA. **SPAIN.**

Dead. Lands sold, circa 1907, to La Estrella Copper Mines, Ltd. Formerly at Los Martires, Granada, Spain.

CIÉTÉ ANONYME LA ESTRELLA. **SPAIN.**

Office: 161 Boulevard Haussmann, Paris, France. Mine office: Los Martires, Grenada, Spain. Capitalization, 200,000 francs. Lizardo González, vice-president; Louis Vardón, agent; Huberto Meersmans, general manager; Antonio Melián, superintendent. Property includes La Jerezana, El Ensueño and other copper mines, at Los Martires, which were undergoing developments at last accounts; an argentiferous copper group at Alpujara, Granada, and an argentiferous copper group at Trevelez.

STRELLA MINING CO. **UTAH.**

Dead. Formerly at Milford, Beaver Co., Utah. Described Vol. VI.

THEL CONSOLIDATED MINES CO. **WASHINGTON.**

Office and mine: Index, Snohomish Co., Wash. Geo. A. Pounder, president and general manager, at last accounts. Organized 1902, with capitalization $3,500,000, shares $1 par, as merger of Ethel Copper Mining Co. and John D. Copper Co. Lands, 37 contiguous claims, carrying 21,000′ of the strike of the vein. The Ethel group has a 2,000′ tunnel, showing a considerable body of low-grade oxidized ores, bornite and chalcopyrite, with quartz gangue, claimed to average 4% copper, with small gold and silver values. Has a Pelton water-wheel and 75-ton concentrator, latter, connected with mine by a 4,000′ gravity tram, having a crusher, rolls and Huntington mill. Ores slime badly in concentration. Company began the payment of 1% monthly dividends in 1903, and mine was shut down shortly thereafter. Property under option to McAllister-Rowland Copper Mining Co. Idle at last accounts.

ETHEL COPPER MINING CO. **WASHINGTON.**

Dead. Succeeded, 1902, by Ethel Consolidated Mines Co. Formerly at Index, Snohomish Co., Wash.

ETHEL GOLD MINING CO. **COLORADO.**

Dead. Formerly at Turret, Chaffee Co., Colo. Described Vol. VI.

ETRUSCAN COPPER ESTATES, LTD. **ITALY.**

Office: 139 Queen Victoria St., London, E. C., Eng. Mine office: Campiglia Marittima, Tuscany, Italy. E. J. Vavasour Earle, chairman; Henry Pope, secretary; E. Hibbert, general manager; R. C. Alabaster, superintendent. Organized Dec. 13, 1900, under laws of Great Britain, and reorganized Dec. 7 1904, under same title, with capitalization £575,000, shares £1 par, fully issued. Debentures, £199,000, at 6%, redeemable at 105, March, 1912, or earlier, at company's option; also £24,000 second-mortgage debentures, at 6%, payable July, 1912. In July, 1907, first-mortgage debenture holders received second-mortgage debentures, in payment of 2 years' accumulated interest, and payment of interest on second-mortgage debentures, due January, 1908, was postponed until July, 1908. Company also is supposed to have a considerable floating indebtedness.

Lands, 2,000 acres freehold, and 600 acres held under perpetual mining rights, including the old Lanzi, Temporino and Rombola mines. These properties show numerous and extensive old workings, certainly as ancient as the Roman era, and probably dating back to Etruscan times. During the Nineteenth Century various Italian, French and English companies attempted, without success, to work these mines, which are honeycombed by ancient inclines, adits, drifts, winzes and stopes. The property was examined by C. Algernon Moreing, Edgar P. Rathbone, R. J. Frecheville, Alexander Hill and J. H. Fawcett, all of whom reported unfavorably. *For statements* made by Mr. Moreing, the company *sued his firm, but dropped the suit, for good* reasons. Mr. Faw-

cett examined the mine, and accepted the management, but resigned after, and recovered damages of £250 from Mr. Earle, for slander. Mr. the chairman, considers all experts incompetent, relying for mining kno upon his own extensive experience as a manufacturer of cement, this, of having given him a peculiarly fitting training for acting as the hea copper mining company, as is shown by the fact that Mr. Earle, his and followers, have spent about £500,000 on this property, which proba worth at least a penny in the pound.

The company claims to have 4 cupriferous veins, of 60' to 120' nearly parallel and traceable 1½ miles, but all competent experts agree the ore bodies, while extensive, are pockety and uncertain, while the prin values unquestionably were removed by the ancients. The present comp has sunk on the Cava del Piombo mine the Walter vertical shaft, of 75 me depth, having a 13-meter headgear and duplex hoist, this shaft showing tensive old workings—more workings than ore. Operations have been pended on the west vein. The Govett shaft, of 100 meters depth, shows tensive old workings, with little ore. The Earle shaft, formerly the Coqu 90 meters in depth, appropriately renamed after the chairman of the pany, shows extensive workings, and little else. Le Marchant shaft, of meters depth, shows a little chalcopyrite, disseminated in pyrite, with phibole gangue. While the property is called a copper mine, it seems the tically unanimous opinion of experienced engineers that the principal va doubtful as these may be, are in lead and zinc, rather than in copper.

The reduction works, at Rombola, are connected by rail with the m at Lanzi and Temporino. The plant includes a concentrator and smelter, having a copper furnace of 100 tons nominal daily capacity.

Despite the claims of the management that the ore returned 2.68% co analysis of the figures shows returns of but 1.5% copper for the first 5 y when only 625 long tons of metal were produced. For July, 1906, the comp smelted 2,565 long tons of ore, said to have given returns of 2.19% co with average slag losses of 0.2%.

The Etruscan Copper Estates, Ltd., is one of the best examples extan a perfectly bad management. There is no suspicion of dishonesty, but t is the amplest evidence of utter incapacity, and a density of intellect scarcely could be looked for in a civilized country. The stone age prod better miners.

EUCLID DEVELOPMENT CO. ARIZO

Dead. Formerly at Benson, Cochise Co., Ariz.

EUREKA CONSOLIDATED COPPER CO. NORTH CAROL

Mine office: Gold Hill, Rowan Co., N. C. J. E. Manter, president; Eaton, treasurer; Walter George Newman, manager. Organized Dec. 1, under laws of Maine, with capitalization $10,000,000. Lands, circa 3,500 including the Troutman and Stockton mines, near the Gold Hill Copper C

EUREKA CONSOLIDATED MINING CO. MEX

Dead. Succeeded by Don Carlos & Eureka Consolidated Copper Co. merly at Nombre de Dios, Durango, Mex.

EUREKA CONSOLIDATED MINING CO. NEVA

Dead. Merged, 1905, in Richmond-Eureka Mining Co. Formerly at reka, Eureka Co., Nev.

EUREKA COPPER CO. ARIZO

Dead. Formerly at Globe, Gila Co., Ariz.

EUREKA COPPER MINES, LTD. BRITISH COLUM

Office and mine: Nelson, Kootenay district, B. C. J. J. Malone, p *dent; A. B. Ritchie*, vice-president; L. B. Reynolds, managing director; H

Anderson, secretary and treasurer; preceding officers and R. Bowlby, directors. Organized March 2, 1906, under laws of British Columbia, with capitalization $250,000, shares 25 cents par; issued, $197,500.

Lands, 7 claims, 3 fractional, area 250 acres, showing 5 ore bodies, of which one, opened by a 200′ shaft, shows carbonate and sulphide ores estimated to average 5.5% copper and 0.21 oz. gold per ton. Has a 40-h. p. steam plant, Lidgerwood hoist and 5 small mine buildings. In 1907 shipped 890 tons of smelting ore, netting $15,806.11. Company plans continuing development work and building a tramway.

EUREKA COPPER MINING CO. **WYOMING.**

Dead. Formerly at Encampment, Carbon Co., Wyo. Described Vol. VI.

EUREKA DEVELOPMENT CO. **ARIZONA.**

Dead. Formerly at Bisbee, Cochise Co., Ariz. Described Vol. VII.

EUREKA DEVELOPMENT CO. **ARIZONA.**

Dead. Formerly at Tucson, Pima Co., Ariz.

EUREKA DIAMOND DRILL MINING CO. **CALIFORNIA.**

Office: 303 Union Savings-Bank Bldg., Oakland, Cal. Letter returned unclaimed from former mine office, Jackson, Amador Co., Cal. Capitalization $1,000,000, in $25,000 preferred and $50,000 common shares, $1 par. Lands, 8 claims, area 150 acres, 4 miles west of Jackson, having a 60′ shaft showing ore assaying 20% copper, 5 oz. silver and $20 gold per ton.

EUREKA EXPLORATION CO. **COLORADO.**

Office: Sioux City, Iowa. Mine office: Eureka, San Juan Co., Colo. Theodore Ivens, manager. Property, known as the Ridgeway group, carries auriferous and argentiferous lead and copper ores. Has steam and water power and a 10-stamp mill.

EUREKA GOLD & COPPER MINING CO. **ARIZONA.**

Mine office: Jerome, Yavapai Co., Ariz. C. W. Woods, president; H. M. Woods, secretary and treasurer; Thos. Taylor, general manager and lessee. Lands, 8 claims, 7 miles south of Jerome, near the Iron King mine, opened by shaft showing a 30′ vein with an 8′ paystreak carrying auriferous bornite and chalcopyrite, with occasional visible gold, but has not developed ore in commercial quantities. Lands were bonded to Thos. Taylor, and mine resumed work June, 1907, after several years' idleness.

EUREKA HILL MINING CO. **UTAH.**

Office: 11 East First South St., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. Moylan C. Fox, president; Geo. W. Riter, secretary and managing engineer. Organized Nov. 12, 1875, under laws of Utah, with capitalization $1,000,000, shares $100 par. Is a close corporation. Has paid considerable dividends, but accounts are not published. Annual meeting, third Monday in February. Lands, 5 claims, area 27 acres, patented, also a 25-acre mill site and 100 acres miscellaneous lands, in the Tintic district. Mine, extensively developed, has a 1,500′ main working shaft, and about 25 miles of workings. Ore bodies are lenticular deposits, carrying cuprite, malachite and enargite, with average values of about 1.4% copper, 6% lead, 25 oz. silver and $3 gold per ton. There is a 450-h. p. steam plant at the mine, and a 500-h. p. steam plant at the mill. Main hoist is 16x48′, good for 1,600′ depth, and equipment includes a 30-drill Norwalk air-compressor. Buildings, 16 in number, include a 30x50′ frame machine shop, 30x40′ frame carpenter shop, frame stables of 30x30′ and 30x40′, and a 30x60′ foundry. The reduction plant includes a 23-ton combination mill, with concentrator and pan-amalgamation all combined, in a 240x250′ wooden building, having 100 gravity stamps, 2 Blake crushers, 2 Gates centrifugal crushers *and 50 vanners.* The amalgamating plant has 32 pans. *Company has a sawmill.* Production is principally

silver and lead, copper being secured as a by-product. Latest reported copper production was 134,000 lbs., in 1904. Production, 1907, was 200 carloads of ore.

EUREKA MINE. ARIZONA.

Office and mine: care of I. N. Kinsey, lessee, Globe, Gila Co., Ariz. D. D. Sullivan, superintendent. Lands, 8 miles west of Globe, in vicinity of Inspiration and Live Oak mines, carry silicious ores of 5 to 6% copper tenor, and shipments were made, 1906-1907, to Old Dominion and Calumet & Arizona smelters, for fluxing purposes. Production, 1907, was 528,000 lbs. fine copper.

EUREKA MINE. CALIFORNIA.

Office and mine: care of H. F. Dimock, Carrville, Trinity Co., Cal. Land 2 claims, in Sections 17 and 18, T. 37 N., R. 7 W. Ore, silicious and low in grade, is slightly developed by a 50′ tunnel. Idle for several years.

EUREKA MINE. HONDURAS.

Mine office: Orica, Tegucigalpa, Honduras. At last accounts was a small producer of gold, silver and copper.

EUREKA MINING & MILLING CO. ARIZONA.

Office: P. O. Box 552, Tombstone, Ariz. Mine office: Ft. Huachuca, Cochise Co., Ariz. O. B. Steen, president; E. P. Drap[illegible], vice-president; F. W. Goodbody, secretary; F. N. Wolcott, treasurer. Lands, 7 claims, in 2 groups. The Copper Glance group, opened by tunnels, is claimed to have shipped more than $100,000 worth of ore and concentrates averaging 27% copper, 184 oz. silver and $6 gold per ton. The Eureka group has produced about $15,0[illegible] worth of ore. Property considered valuable, but is idle, and the company is a dead-beat and apparently moribund.

EUREKA MINING, SMELTING & POWER CO. OREGON.

Office: P. O. Box 53, Clarkston, Wash. Mine office: Imnaha, Wallowa Co., Ore. W. E. Howard, secretary; G. E. Nehrhood, superintendent. Land 40 claims, patents applied for, but adverses filed, poorly located for transportation. Company claims to have well developed mines, with much ore in sight and on the dump, but apparently this is either a mistake or something worse; sundry shareholders alleging grossly fraudulent misrepresentations by the management while selling stock. Idle since circa 1905 and apparently moribund.

EUREKA-SWANSEA EXTENSION MINING CO. UTAH.

Office: Provo, Utah. Mine office: Eureka, Juab Co., Utah. Jesse Knight, president; Richard B. Shepard, vice-president; W. Lester Mangum, secretary and treasurer; preceding officers, Jacob Evans and Will Knight, directors. Lands, 140 acres, patented, adjoining the Centennial-Eureka.

EUSTIS MINING CO. QUEBEC.

Mine office: Sherbrooke, Sherbrooke Co., Que. F. C. Davis, superintendent. Mine has a 2,000′ incline shaft, sunk at 20° to 45°, and a long crosscut tunnel, showing lenses of cupriferous pyrite in schistose rocks, mined primarily for making of sulphuric acid, but carrying appreciable values in copper. Equipment includes an electric hoist with 6′ drums, and a hydro-electric power plant with 2 alternators mounted on same shaft, run in parallel, driven by turbine water-wheels, one 150-kw. generator and one 200-kw. generator, using a 3-phase 25-cycle, 2,200-volt current, with electric efficiency of 90 to 93% for alternators and efficiency of 60 to 80% for water-wheel, according to load. Has a mill for preparing ore for shipment to the acid plant of the company in New Jersey.

EVANGELINA COPPER MINING CO. MEXICO.

Office: 202½ So. Broadway, Los Angeles, Cal. Mine office: Santa Catarina del Norte, Baja California, Mex. D. R. Wilder, president; J. H. Coleman, vice-president; Josephine H. Wilder, secretary and treasurer; Tomás Vidaurraza, *superintendent*. Lands, circa 150 acres, carrying a fissure vein of 3"

idth. Has steam power. Idle.

ANS-TANZER CONSOLIDATED COPPER CO. **CALIFORNIA.**

Dead. Formerly at Lavic, San Bernardino Co., Cal.

ANSTON MINING CO. **MEXICO.**

Mine office: Gabriel, San Juan del Rio, Durango, Mex. J. B. Davis, man-r; F. Boland, superintendent. Property, known as La Purísima group, car- auriferous copper and argentiferous lead ores. At last accounts employed nsiderable force.

ELYN MINING & LEASING CO. **COLORADO.**

Mine office: Leadville, Lake Co., Colo. Morris Sterne, manager. Has entiferous and auriferous lead, copper and zinc sulphides. Has steam power.

ENING STAR MINING CO. **WYOMING.**

Dead. Formerly at Riverside, Carbon Co., Wyo. Described Vol. VII.

VERGREEN BLUFF MINING CO. **MICHIGAN.**

Dead. Was succeeded by Evergreen Mining Co. Formerly at Mass, On-agon Co., Mich.

VERGREEN-EUREKA GOLD & COPPER CO.

Dead. A fake that peddled stock, accompanied by a personal "guaranty" 5% dividends, and a 10-year bond against loss. Formerly had an office at Union Square, New York, N. Y.

VERGREEN GOLD & COPPER MINES CO. **COLORADO.**

Office: Empire Bldg., Denver, Colo. Mine office: Apex, Gilpin Co., Colo. W. H. Grayson, president and manager; W. C. Hollister, secretary and asurer. Organized 1904, under laws of Colorado, with capitalization 00,000, shares $1 par. Lands, 6 claims, 3 patented, area 33 acres, also a acre placer claim and quarter-acre millsite, in the Pine Creek district, show-g 2 fissure veins, one opened by 3 shafts of 40′ to 80′ depth, and by tunnels 550′ and 400′, showing a considerable body of low grade disseminated sul-ide ore, with some malachite and tetrahedrite. Carload shipments, 1905, ve returns of 31% copper and 24 oz. silver per ton, from first grade ore, and % copper and 12 oz. silver from second grade ore. Has a Leyner air-com-ressor. A site has been graded for a 50-ton mill of 40x50′ size, to have rolls, chards jigs and Card tables.

VERGREEN MINING CO. **MICHIGAN.**

Office: 15 William St., New York, N. Y. Mine office. Mass, Ontonagon , Mich. Jos. E. Gay, president; John R. Stanton, secretary. Organized Sep-mber, 1853, under laws of Michigan, with capitalization $500,000, shares $25 , under name of Evergreen Bluff Mining Co., and reorganized, under present e, with capitalization $1,000,000, shares $25 par.

Lands, 600 acres, adjoining the Mass Consolidated on the east and the dge mine of the Mass Consolidated on the south. Mine was worked at in-rvals, 1854-1870, producing 1,351,174 lbs. fine copper, at a cost of $223,582.24. In 1862 the predecessor of the present company deeded to the Ogima com-ny, succeeded later by the Mass Consolidated, 16 acres of land from the rtheast corner of its territory, adjoining the Ridge mine, to enable the Ridge ink its shafts and work the bed lying north of the Evergreen lode, in ex-ange for which the Ogima transferred all right and title to the Evergreen d under the entire Ogima territory to the Evergreen compa..y, hence it fol-ws that the Evergreen Mining Co. owns a portion of the Evergreen lode on e property of the Mass Consolidated. Idle since 1870.

VERGREEN MINING & TUNNEL CO. **UTAH.**

Office: care of H. G. McMillan, manager, Salt Lake City, Utah. Letter turned unclaimed from *former mine office, Alta, Salt Lake Co., Utah.* Lands *opened by tunnel with about 1,700′ of underground* workings, claimed to

show considerable copper ore of low grade. Idle for several years and pany apparently moribun l.

EVOLUTION-KEYSTONE MINING CO. IDA

Letter returned unclaimed from former office, Missoula, Mont. Mine offi Osburn, Shoshone Co., Idaho. Mrs. J. McCormick, president; W. W. Woo vice-president; A. E. Robinson, secretary; preceding officers, J. H. Nordqu and Edw. Lindsley, directors. Lands, in McFarren Gulch, adjoin the Gray a Verde mines. Surface shows rich stringers of silver-lead ore, opened trenches. Has 2 tunnels, longest 400′.

EXCELSIOR COPPER CO. ARIZON

Dead. Was a swindle, perpetrated by the notorious Wm. F. Wernse ga Formerly at Pima, Graham Co., Ariz. Described Vol. V.

EXCELSIOR COPPER CO. QUEBE

Mine office: West Broughton, Megantic Co., Quebec. Mine is develop open-cast and by shafts. Idle.

EXCELSIOR COPPER & GOLD MINING CO. WYOMIN

Dead. Formerly at Riverside, Carbon Co., Wyo.

EXCELSIOR GOLD & COPPER MINING CO. ARIZON

Dead. Formerly at Flagstaff, Coconino Co., Ariz.

EXCELSIOR MINING CO. NEW MEXIC

Dead. Formerly at Organ, Donna Ana Co., N. M.

EXCELSIOR MINING & DEVELOPMENT CO. NEW MEXIC

Office: St. Joseph, Mo. Mine office: Orogrande, Otero Co., N. M. A. Warnock, general manager. Lands include the Nashville and Three Frie claims, said to carry a 4′ vein of 4% silver-copper ore, also lead carbonate to 50% in tenor.

EXCELSIOR MINING & SMELTING CO. NEVAD

Dead. Formerly at Yerington, Lyon Co., Nev.

EXCELSIOR MOUNTAIN COPPER CO. NEVAD

Mine office: Hawthorne, Esmeralda Co., Nev. F. D. Qualey, preside and general manager; J. H. Suits, secretary. Lands, 13 claims, area 260 ac in process of patenting, 16 miles southeast of Hawthorne and 16 miles fr Sodaville, the nearest railroad point, giving promising surface showings of c per for a distance of circa 9,000′ along a contact between granite and li stone. Has several shallow shafts and about a dozen short tunnels, with 500′ tunnel showing ore averaging circa $8 gold per ton. Has a good pow plant, with 12-drill air-compressor, and 15 mine buildings.

EXPECTATIVA MINING CO. MEXIC

Office: care of W. R. Ramsdell, Guadalajara, Jal., Mex. Mine offi Ameca, Jalisco, Mex. Lands, 10 miles southwest of Ameca, show aurifer and argentiferous copper and lead ores, assaying up to 27% copper.

FAEO GRUBE. NORWA

Mine office: Haugsund, Christiania, Norway. Property is several s mines, having ore averaging about 4% copper tenor. Idle at last accounts.

FAIRVIEW MINING CO. MONTA

Dead. Formerly at Basin, Jefferson Co., Mont.

FALLS CREEK MINING CO., LTD. BRITISH COLUMB

Office: care of R. H. Finley, secretary, Spokane, Wash. Mine offi Nelson, Kootenay district, B. C. L. H. Snyder, president and treasurer; J. Porter, vice-president; M. C. Monoghan, mine manager; preceding officers J. P. Swedebery, directors. Organized 1907, under laws of Washington, W capitalization $1,500,000, shares $1 par, and registered under laws of Brit *Columbia.* Lands, 6 claims, 2 crown-granted, area circa 240 acres, adjoi

assaying 17.1% copper, 38.1 oz. silver and 2.3 oz. gold, showing an ave extraction of 3.13% copper, 6.98 oz. silver and 0.42 oz. gold per long ton.

About 300 men are employed at the mines and works. Native labo inefficient, but cheap, wages being about 30 cents per day. The comp having reached the end of its resources, is being financed by the Internati Copper Co., Ltd., up to the amount of £60,000. The property is of consider promise, though much overestimated in its early stages, and, under the cap management of Mr. Arthur Thomas, who is a thoroughly good man, should made a success, if success is attainable, provided his suggestions are follo and the company does not come to grief from lack of funds.

LES MINES DE CUIVRE DE LA FARE, LTD. FRAN

Office: Dashwood House, New Broad St., London, E. C., Eng. Mine at Vaujan, Isère, France. Chas. Dufaure de la Prade, chairman. Organized 25, 1904, under laws of Great Britain, as Les Mines Françaises, and changed to present title November, 1907, with capitalization £47,000, share par, in £30,000 cumulative 8% preference shares and £17,000 common sha issued, £19,997.

Lands, 563 hectares, on the left bank of the river Flumet, on the flank of the Grandes Rousses Alpes, circa 50 kilometers from Grenôble. P erty shows slightly auriferous and argentiferous chalcocite and chalcopy with quartz gangue, company claiming average assays of 16.17% copper, w seems excessive. Mine is opened on 6 veins by 21 tunnels and galleries, about 500 meters of workings, estimated by company to expose 400,000 of ore, which is considered an overestimate.

Transportation is by 6 aerial trams, leading from the mine working the mill, and company plans an aerial tram from the mill to the public r The mine and mill have electric power.

The mill, of 5 tons hourly capacity, has a Classeur centrifuge, which fects dry centrifugal concentration, company claiming to produce a 50% centrate, which also is regarded as improbable.

SOCIEDAD MINERA FARELLÓN DE TONGOY. CHI

Office: Valparaiso, Chile. Mine office: Tongoi, Coquimbo, Chile. Or ized Jan. 21, 1901, under laws of Chile, with capitalization 150,000 pesos, sh 1,500 pesos par.

FARGO GOLD & COPPER MINING CO. OREG

Dead. Formerly at Imnaha, Wallowa Co., Ore. Described Vol. VII.

FARMINGTON GOLD & COPPER MINING & MILLING CO. UT

Office: care of J. Stuart Wallingford, secretary and treasurer, Paris, Letter returned unclaimed from former mine office, Farmington, Davies Utah. H. C. White, president. Capitalization, $250,000, shares $1 par. For manager, Fred. H. Perkins, was arrested, 1906, on charge of embezzling $ from the company. Idle.

FARRELL COPPER CO. MONTA

Mine office: Butte, Silver Bow Co., Mont. W. C. Lewis, president; C ton H. Hand, vice-president; J. D. Slemons, secretary and treasurer; prece officers, A. T. Morgan, Walter C. Lewis, Donald Campbell, W. H. Hall Daniel Tewey, directors. Organized July 24, 1906, under laws of Mont with capitalization $1,000,000, shares $2.50 par. Lands, 17 acres, in the so eastern part of the Butte district, having a 200′ shaft, sunk jointly with Alliance Copper Co., with a crosscut on the 200′ level showing a little ore ca ing copper, lead, zinc and silver values.

FARRELL COPPER CO. MONTA

Dead. Succeeded, circa 1902, by Pittsburg & Montana Copper Co. *merly at Butte*, Silver Bow Co., Mont. Described Vol. II.

WELL MOUNTAIN COPPER CO. **COLORADO.**

Office: care of Elisha T. Hewitt, Evans Blk., Denver, Colo. Mine office: mboat Springs, Routt Co., Colo. Organized 1907, under laws of Colorado, capitalization $5,000,000. Lands, 4 lode claims and 560 acres of gold er claims, in the Farwell Mountains, 3 miles from Hahn's Peak, and circa miles from Steamboat Springs. Plans developing a water power by dam.

UQUIER COPPER CO. **VIRGINIA.**

Mine office: Warrenton, Fauquier Co., Va. Idle several years.

VORITE GOLD & COPPER MINING CO. **WASHINGTON.**

Office: Nelsonville, Ohio. Mine office: Nighthawk, Okanogan Co., Wash. M. Parker, president; J. F. Baldridge, secretary; H. D. James, general man- r; Ed. Williams, mine superintendent. Organized December, 1902, with pitalization $2,000,000, shares $1 par. Lands, 14 full and 14 fractional ims, area circa 300 acres, adjoining the Nighthawk mine, on Mt. Ellemeham, the Wanicutt Lake district, 34 miles from the Canadian Pacific railway, show- 5 veins, of which one, ranging 1' to 5' in width, is opened by a 950' upper nnel and an 850' lower tunnel on the Giant claim, carrying mainly silver-lead lues, with some gold and copper.

AY-CANANEA COPPER CO. **MEXICO.**

Office: 610 First National Bank Bldg., Duluth, Minn. Mine office: La anea, Arizpe, Sonora, Mex. Marcus L. Fay, president and general man- r; W. H. Yawkey, vice-president; Geo. M. Fay, secretary; J. A. Daugherty, asurer and local manager; preceding officers, Peter A. Kemp and Peter ney, directors; Albert Weir, mine superintendent. Organized Sept. 4, 04, under laws of Arizona, with capitalization $3,000,000, shares $5 par, and organized under laws of Mexico as Cananea-Eastern Mining Co., S. A.

Lands are very extensive, having been added to at frequent intervals ce organization of company. Original lands were 2 tracts of 16 denounce- nts, a total of 900 pertenencias, aren 2,127 acres, in 2 groups about 2 miles art, circa 20 miles south of La Cananea, formerly held by Fortuna Mining and Sonora Development Co. Bought, 1907, circa 1,100 acres in the Sierra Mazaral, about 6 miles northeast of Cananea, lying north of the lands of the nora Development Co. Bought, circa November, 1907, lands of Dorotea Min- g Co., in the Sierra Cananea, about 6 miles northwest of Puertecitos Pass, d, from same company, the Dorotea group of 5 claims, circa 50 miles north- st of La Cananea, in the Magdalena district of Sonora, having about 300' workings, showing ore giving fair assay values in copper. Bought, circa ember, 1907, two groups, area 149 hectares, on the southwestern slope of Ajo Mountains, from the Cananea-Eastern Mining Co., including La Zona up, area 49 pertenencias, lying 8 miles southeast of Douglas, Ariz., in the thern part of the Moctezuma district of Sonora, and La Princesa and La ona groups, area 100 hectares, in the Sierra Ajo, 21 miles east of Cananea, ter opened by a 180' tunnel showing promising sulphides, and a 40' shaft rying copper oxides and bornite averaging about 10% copper, with small d and silver values. Lands also include the Forest and Fortuna groups, circa miles south of Cananea, and the Big Duluth, circa 8 miles northeast of Cananea.

Principal workings are on the Sulphide group, having a vein traceable ree kilometers, of which the Fay-Cananea owns nearly 2 miles of the out- p, this vein being claimed to average about 150' in width, but it is improb- le that the full width will be found workable. The Sulphide group includes o shafts having two 100' shafts, from which more or less high grade silver re was stoped in the past. New work *includes 2 permanent shafts, deepest* 227 at last *accounts, and a tunnel planned to cut 20 or more* veins in a length

of circa 6,000′. A 26′ shaft on the Azurite claim shows ore giving averag assays of 6% copper, 10% lead and 30 oz. silver per ton.

Property is considered promising and officers are men of good local stan ing, though company was unable to redeem its promise of beginning shipmen prior to July, 1907.

FEDERAL COPPER CO. WYOMING

Dead. Formerly at Laramie, Albany Co., Wyo.

FEDERAL COPPER CO., LTD. WISCONSIN

Dead. Succeeded, circa 1902, by Federal Gold & Copper Co. Formerly at Superior, Douglas Co., Wis.

FEDERAL COPPER MINING. & SMELTING CO. ARIZONA, NEW MEXICO & TEXAS

Dead. Wound up by receiver, 1907, and property sold. Formerly at E Paso, El Paso Co., Tex. Described Vol. VI.

FEDERAL-ELY COPPER CO. NEVADA

Office: Salt Lake City, Utah. Mine office: Ely, White Pine Co., Nev Adrian C. Ellis, Jr., president; W. J. Craig, vice-president and general man ager; R. J. Evans, secretary; L. H. Farnsworth, treasurer; preceding officers John T. Hodson, Wm. K. Bradley and Hon. W. H. Dickson, directors; Geo. W Kessler, superintendent. Organized 1906, and articles of association amended circa April, 1908, to render stock assessable, and a 5-cent assessment levied. An issue of treasury stock, 1907, was said to be underwritten by Peter Whit ney, et al., of New York.

Lands, 20 claims, 3 fractional, area 383 acres, also the Huesser ranch, ca 600 acres, near Lane, bought Dec. 8, 1906. Mining lands include 8 claims nort of the Nevada Consolidated, 3 claims between the Cumberland-Ely and Turne Ely, and the Queen of the West group, in Robinson Cañon. Company is said to have paid $215,000 for its lands.

The property shows a limestone capping, pitching to the east, said to be underlaid by cupriferous monzonite, and to carry 3 parallel fissures, about 600′ apart, the fissures also being said apparently to be shear zones, carry about 400′ in width, showing a little copper and lead ore, both argentiferous and auriferous. The limestone capping on the Savage claim is said to carry argentiferous lead ore. Churn-drill borings are said to have given a satisfac tory showing of ore, and there also has been some test-pitting and surface trenching.

Development is by 4 shafts, the main shaft, planned to be sunk 400′, being said to be near the contact of the 3 ore zones, which seems peculiar, if they are parallel, as claimed.

The Queen of the West shaft shows, at depth of 110′, a sulphide ore body of considerable size, averaging circa 3% copper, 1 to 2 oz. silver and 40 to 5 cents gold per ton.

The Kessler shaft, about 100′ deep, near the tunnel, shows lead carbonates of fair tenor.

The main tunnel, planned to be driven 1,500′, starts from a cañon, and will connect with the shaft to give a 400′ back. It is expected that the tunnel will cut cupriferous porphyry before reaching the shaft.

The property has a steam plant, and a water supply estimated at 87 miner's inches in the dry season, which will be more than sufficient for the company's own use, and constitutes a valuable asset, as water is scarce in the camp.

Transportation is available by a railroad running through the company's lands that passes near the mouth of the tunnel.

Late 1906 the company was said to plan building a 500-ton mill in 1907

these plans were premature. Idle at last accounts, but planned resump-

DERAL GOLD & COPPER CO. **NEVADA & WISCONSIN.**

Office: 214 Lumber Exchange, Minneapolis, Minn. Mine office: Eureka, reka Co., Nev. C. S. Dudley, president and general manager; M. B. Coburn, e-president; H. S. Dudley, secretary and treasurer. Organized, 1902, under laws of Arizona, with capitalization $2,500,000, shares $1 par. Lands in- de 600 acres in the St. Croix valley, Burnett county, Wisconsin, and 520 res 6 miles southeast of Superior, Douglas county, Wisconsin, these tracts ing on the St. Croix and Minong native copper ranges. Nevada lands are claims, including the Como-Eureka mine, showing 4 parallel veins, estimated management to carry average values of $8 to $20 per ton. Mine has a 0' shaft, with 750' of drifts and crosscuts. Equipment includes an electric ght plant and a 100-ton concentrator. Mill was run, 1905, several months, parently for gold values, and produced about $16,000. As management esti- ates average cost of mining and milling at $3.50 or less per ton, it is evident, ther that value of ore has been overestimated, cost of mining and milling derestimated, or that amount of ore in sight is very small. Idle and appar- ly moribund.

EDERAL GOLD & COPPER MINING CO. **UTAH.**

Dead. Formerly at Blue Acre, Beaver Co., Utah. Fully described Vol. VII.

EDERAL MINES CORPORATION. **COLORADO.**

Mine office: Idaho Springs, Clear Creek Co., Colo. Mine has argentiferous d auriferous lead and copper sulphides. Has steam power. Presumably idle.

EDERAL MINING CO. **ARIZONA.**

Dead. Reorganized, 1905, as Gila Valley Copper Co. Was a bad egg. Formerly at Safford, Graham Co., Ariz. Fully described Vol. V.

OCIETA MINIERE DELLA FENICE MASSETANA. **ITALY.**

Dead. Lands sold to Societa Anonima delle Minière di Montecatini. For- erly at Massa Marittima, Grosseto, Tuscany, Italy.

ENTRESS MINING CO. **NORTH CAROLINA.**

Dead. Succeeded by Century Development Co. Formerly at Centre, Guil- ord Co., N. C.

FERGUSON MINING & SMELTING CO. **NEW ZEALAND.**

Office: Auckland, N. Z. John Strathern, general manager. Capitaliza- ion, £30,000. Lands, 565 acres, in the Thames Goldfield, also upwards of 2,000 cres of native land at Whangaroa, on the Coromandel peninsula, circa 125 iles northwest of Auckland, showing outcrops of cupriferous pyrite. Lands ow nearly 100 veins and stringers, of various sizes and forms, principal ins ranging 2' to 8' in width, carrying mainly massive cupriferous pyrite, ith a little galena, giving average assays of about 4% copper and up to £6 ombined gold and silver values per long ton. Development is by about 20 hort crosscut tunnels. Has a mill and a smelter, latter, on tidewater, erected at a cost of about £8,000, having a 150-ton Colorado Iron Works hot-blast pyrite matting furnace. Previous to erection of smelter, ore was milled, and concentrates shipped in bulk to Australia, Swansea and the United States, concentrates averaging £33 per ton in value. Wages are $2 per 8-hour shift.

ERNANDO. **MEXICO.**

Mine office: San Fernando, Tamazula, Durango, Mex. Property includes Fortuna group, carrying auriferous and argentiferous copper ores. Has team and electric power, with a 100-ton concentrator and 40-ton smelter, and ly was operated by Fernando Mining Co. Production, 1903, was 554,669 s. copper. Idle several years.

FERNANDO MINING CO. M

Dead. Formerly at San Fernando, Tamazula, Durango, Mex. De
Vol. VI.

FERRIS-HAGGARTY COPPER MINING CO. WYC

Mine office: Rudefeha, Carbon Co., Wyo. Is controlled, through
ownership, by Penn-Wyoming Copper Co.

COMPAÑIA DE MINAS FERROCOBRIZAS.

Office: San Isidro, 16, Sevilla, Spain. Mine office: El Carpio,
gana, Huelva, Spain. Don. Salvador Sánchez Castañer, agent. Land
73 hectares, include the Santa Maria de Gracias group, worked in very
days. Property is leased to the Sociedad Française de Etudios. Ore is
erous pyrite.

FIDELITY COPPER CO. I

Office: care of Commonwealth Trust Co., Portland, Ore. Mine
Homestead, Washington Co., Idaho. Capt. Herbert L. Davis, superint
Lands, 17 claims, area 340 acres, 5 miles from Homestead, in the Seven
district, opened by 10 pits and shafts and a 240' tunnel, said to show
tact vein between granite-porphyry and limestone, carrying native
azurite, malachite and chalcocite. Prospectus of company gives no
lars regarding capitalization, organization and officers, and company
regarded favorably.

FIDELITY MINING CO., LTD. MICH

Office: care of I. P. Griswold, chairman, Allegan, Mich. Mine offic
toria, Ontonagon Co., Mich. C. G. Turner, secretary; H. F. Marsh, tre
Organized February, 1903, with capitalization $300,000. Lands are in
15, T. 50 N., R. 40 W., 2½ miles northwest of the Victoria mine. Idl
organization.

FIFTH CREEK CENTRAL SILVER & COPPER MINING CO., N. L. AUSTR

Mine office: Fifth Creek, South Australia.

FAUSTO FIGUEROA.

Office and mine: Morococha, Junín, Perú. Property is the Santo
mine, from which a little ore was extracted, 1905, in development work.

FINDLAY COPPER CHIEF MINING CO. NE

Office: Findlay, Ohio. Mine office: Las Vegas, Lincoln Co., N. M.
N. Dotz, president; P. M. Cox, secretary; R. E. Taylor, treasurer. Org
1907, with capitalization $1,000,000, shares $1 par. Lands, 2 claims,
Yellow Pine district, circa 25 miles southwest of Las Vegas, having a 30
and a 60' tunnel, said to show ore.

FINLEY GOLD & COPPER MINING & MILLING CO.

Dead. Formerly at Castleton, Grand Co., Utah.

FINNISH-AMERICAN MINING CO. FIN

Office: Calumet, Mich. Mine offices: Kisko, Åbo, Finland, and J
Kupio, Finland. John Daniell, president; Edw. Ulseth, first vice-pre
Henry Ketti, treasurer; Oscar J. Larson, secretary; preceding officers
Saari, Chas. J. Wickstrom, John Benson and Albert Julin, directors;
Jacob Wilson, general superintendent. Organized December, 1906, und
of Minnesota, with capitalization $750,000, shares $1 par. Lands, 4
bought of the Fiskars company, including the Orijarvi and Hokka min
mer being the more important. Properties have both water and rail
portation, and have been prospected by 8 diamond-drill holes, one of the
showing gold ore.

The Hokka group, area 240 acres, includes four 40-acre claims, fr
and two 40-acre claims, leasehold, latter held for 25 years under opt

urchase, 2 miles from Joensuu, in the Maanseka Mountains, circa 200 miles om Viborg, near the boundary between Finland and Russia. This mine, pened 1860, secured a small production of chalcopyrite under the most primi- ve conditions, ore having been shipped on horseback to the Pitkaranta melter.

The Orijarvi mine, credited with an output of $5,000,000 in copper and ilver, has surface indications giving little evidence of the large amount of ore ing below, ore bodies being deposits in silicious limestone, near an intrusive uartz-diorite contact, ore being mainly cupriferous pyrite and pyrrhotite, ssociated with small quantities of galena and large quantities of sphalerite, ll slightly auriferous and argentiferous. The Orijarvi tract, of circa 10 quare miles, is a parallelogram of approximately 2x5 miles, opened by 9 hafts, deepest 600', showing large ore bodies, with stopes up to 60' in width. Mine, opened A. D. 1757, and worked until 1873, was idle thereafter until taken er by predecessor of present company, circa 1904. The old dumps at the Orijarvi contain large quantities of sphalerite, discarded as worthless, but robably of present value, as a zinc smelter could be built at a reasonable ost, if shipping were found impracticable. Mine has a good machinery plant, rom Chicago, and employs circa 75 men. Property considered promising and anagement good.

FIRST CHANCE MINING CO. **WASHINGTON.**

Mine office: Excelsior, Pierce Co., Wash. F. M. Lewis, president. Ores re refractory. Presumably idle.

FIRST NATIONAL COPPER CO. **CALIFORNIA.**

Office: 25 Broad St., New York, N. Y. Mine office: Kennett, Shasta Co., Cal. Thos. W. Lawson, president; T. M. T. Raborg, treasurer; preceding fficers, Edgar L. Newhouse, Geo. N. Towle, Thos. J. Barbour and R. N. Bishop, irectors. Organized February, 1908, with capitalization $3,000,000, shares $5 ar; $2.50 paid in. Apparently 525,000 shares were issued at $2.50, providing $1,312,500, less the expense of organization. Corporation is a securities hold- ng company, planned to finance the Balaklala Consolidated Copper Co., which ame to grief, and is practically a reorganization of that company. It was aid, July, 1908, that 98% of the Balaklala stock had been deposited for ex- hange into First National stock, time for exchange having been extended. ompany plans loaning the Balaklala Consolidated $1,312,500, to pay off its hating indebtedness and leave a working capital of $375,000 to $500,000 for he latter. Company is said to have circa 4,500 shareholders.

The mine is fully described under name of Balaklala Copper Co., which olds direct title. It was hoped to have the property on a producing basis by 1908. There was much grumbling by shareholders over the rather rastic method of reorganization, but, while the Balaklala was sadly misman- ged, the plan of reorganization followed seemed to be the only way out of he muddle into which the company had fallen. The standing of the com- any, none too good at best, was further injured by placing Lawson at the ead of the corporation.

FIRST NATIONAL MINING CO. **NEW MEXICO.**

Office: Chickasha, Okla. Mine office: Orogrande, Otero Co., N. M. J. A. ogart, president; John Wells, vice-president; S. Howard Leech, secretary; . Goff, treasurer; preceding officers, Wilton M. Bartlett, N. H. Ledford, . Wells and Edw. Burson, directors. Property is the Forest Queen mine, hich is now a 20' vein, opened by tunnel, with a shaft planned.

FIRST TRANSBAIKALIAN MINING CO. **SIBERIA.**

Office and mine: *corner Sofeyska and Soongareyska Sts., Chita, Trans aikalia, Siberia. Company advertises that it possesses* great mineral wealth,

including copper, but the principal mining values undoubtedly lie in th pewter ore that the company claims to possess. As pewter ore never has be found before, the company's prospects are bright. Doubtless more careful search of the wonderful lands of this corporation would show brass ore als and possibly native babbitt metal.

FISKUM SYNDICATE, LTD. NORWAY

Office: 53 New Broad St., London, E. C., Eng. Mine office: Kongsberg, Christiania, Norway. H. V. Anthony, managing director; C. S. Goodwin secretary. Organized March 2, 1905, with capitalization £2,400, shares £1 par issued, £2,375. Property is an option on 50 claims, carrying copper, lead and zinc, on which a little work has been done. Presumably idle.

FITTS COPPER CO. ARIZONA

Dead. Formerly at Clifton, Graham Co., Ariz.

FITZPATRICK & DODD. MEXICO

Office and mine: Teocaltiche, Ayutla, Jalisco, Mex. Patrick Fitzgerald manager. Lands include the Chapuza, Falda and Puerta mines, carrying argentiferous lead and auriferous copper ores. Employed circa 25 men at last accounts.

FITZROY COPPER MINES, LTD. AUSTRALIA

Dead. Was succeeded, 1907, by Great Fitzroy Copper Mines, Ltd. Formerly at Mount Chalmers, Queensland, Australia. Described Vol. VII.

FIVE BEARS MINING CO. CALIFORNIA

Office: 301 Gaff Bldg., Chicago, Ills. Mine office: Genesee, Plumas Co., Cal. F. A. Meidinger, president; G. H. Goodhue, vice-president and superintendent; A. Vermaas, secretary; J. D. Meidinger, treasurer; preceding officers and E. C. Goeckel, directors. Organized Apr. 10, 1903, under laws of South Dakota, with capitalization $2,500,000, shares $1 par; issued $2,350,000.

Lands, 10 claims, 9 patented, area 200 acres, showing 6 ore bodies, as fissure veins in talcose schist and as contact deposits between schist and porphyry, of which one, under development, of 4′ to 20′ width, is traceable circa 9,000′, carrying chalcopyrite, associated with pyrite estimated by company to average 2.6% copper, 1.8 oz. silver and $1.40 gold per ton. Development is by tunnels of 1,296′, 380′ and 60′, on the vein, and a 240′ crosscut tunnel, with 3,420′ of workings, estimated to show 80,000 tons of ore, with 9,000 tons blocked out for stoping. Property was worked, 1876-1893, for gold values in the gossan.

Company has a 50-h. p. water plant for the mine and a 1,400-h. p. hydroelectric installation for commercial use. Equipment includes 11 mine buildings, a 3-drill air-compressor and a 10-stamp mill. Nearest railroad is 34 miles, but the Western Pacific is to build into the district, upon the completion of which ore will be shipped. Company estimates average cost of mining at only 55 cents per ton. Continuous development is planned. Property, though low in grade, is considered promising.

FIVE POINTS COPPER MINING CO. ARIZONA

Mine office: Globe, Gila Co., Ariz. A. T. Hammons, treasurer; J. C. Britt, superintendent. Is said to be controlled, through stock ownership, by Cananea & Globe Exploration & Development Co.

Lands, 39 claims, including the Peabody group of 5 claims near Bloody Tanks. The Clark, Lockwood and Van Wagenen groups, aggregating 34 claims, are near the Gibson mine, at the head of Pinto Creek, circa 14 miles west of Globe. Property shows malachite near surface, with some azurite and chalcocite at shallow depth, and company claims assays of 38% copper and 49 oz. silver per ton, with traces of gold. Development is by the Solace 150′ inclined shaft, and the Crackerjim 350′ shaft, circa 1,500′ apart, latter showing a vein

of 20′ estimated width, giving assays of 4 to 12% copper, a 20″ paystreak being claimed to give average assays of 25% copper, 415 oz. silver and 38.5 oz. gold per ton, which is entirely too good to be true, with balance of vein carrying chalcopyrite of circa 4.5% average copper tenor, the paystreak figures being gross exaggerations.

Equipment includes a small steam plant and hoist, and plans were drawn for a 300-ton concentrator, which failed to materialize. Shipped, 1906, a little ore to the Old Dominion smelter. Property considered promising, notwithstanding its ridiculously exaggerated claims.

FLAG GOLD & COPPER MINING CO., LTD. **AUSTRALIA.**

Office: Morgans St., Ravensthorpe, Western Australia. Mine office: Kundip, Phillips River Goldfield, Western Australia. Ralph Anderson, secretary; Charles Grant, mine manager. Organized March 14, 1907.

Lands, 70 acres held under gold mining lease, and 5 acres held under tailings area lease. Property shows a 6′ vein, from which former owners shipped 1,222 long tons of ore, yielding 39 long tons fine copper and 889 oz. gold, and present company shipped 405 tons, to the Ravensthorpe smelter, returning 41.84 long tons copper, 250 oz. silver and 559 oz. gold. Test shipments of 32 tons, circa June, 1908, returned 9.7% copper and 21 dwts. gold per long ton. Apparently ores average about 17 dwts. gold per long ton. Development is by 3 shallow shafts, workings not being well laid out. Property has an old stamp-mill.

FLAGSTAFF COPPER MINING CO. **UTAH.**

Office: 902 Wells Bldg., Milwaukee, Wis. Operating office: 17 West Second South St., Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. Thos. J. Pringle, president; Chas. H. Moss, vice-president; Paul D. Durant, secretary; Kenneth W. Jacobs, treasurer; preceding officers, Wm. P. Hinlow, Bishop Canfield, F. G. Gaston and W. D. Ladd, directors; Jas. E. Beveridge, superintendent. Organized Apr. 22, 1908, under laws of Arizona, as successor of Consolidated Flagstaff Mines Co., with capitalization $2,000,000, shares $5 par. Annual meeting, first Tuesday in October.

Lands, 29 claims, partly patented, area circa 500 acres, and 14 acres miscellaneous lands, in the Little Cottonwood and Big Cottonwood districts, carrying several ore bodies, of which one, ranging up to 300′ in claimed width, and traceable 2,000′, is developed by the 2,850′ Tom Moore tunnel, which also cuts 4 smaller veins, and has a 450 crosscut to the northeast, with about 4,000′ of workings. Property also has the 500′ Burgess tunnel, 1,200′ Burnswood tunnel, 1,200′ Flagstaff tunnel and 700′ Flagstaff shaft. Company plans extending the Tom Moore tunnel, to cut the Flagstaff ore zone at considerable depth. Present workings show mainly chalcopyrite, with occasional bornite.

The mine, opened circa 1869, was operated extensively, and presumably at a profit, by the Flagstaff Mines, Ltd., and by the Alta Consolidated Mining Co. Former produced circa $9,000,000 worth of ore from above the 400′ level, mainly silver-lead carbonates, being unable to treat the argentiferous galena and copper sulphides profitably in early days. A considerable quantity of ore of payable tenor remains on the old dumps, and some of this has been shipped.

Equipment includes electric power, with 7-drill and 3-drill Ingersoll air compressors and necessary mine buildings.

Company is said to have a profitable contract with the American Smelting & Refining Co., receiving a premium of 10 cents for each unit of silica, with base rate of $2.25 per ton. In the case of some shipments company has received a bonus from the smelter, for excess of iron, with smelting charge free. About 30 men are employed, and the company plans advancing the Tom Moore tunnel, *drifting on parallel fissure veins*, and cutting the Flagstaff

ore bodies, at a depth of circa 960', in the Flagstaff shaft. Property ered promising and management good.

FLATIRON MINE. MON

Office: 42 Broadway, New York, N. Y. Mine office: Butte, Silv Co., Mont. Is owned jointly by Adolph Lewisohn and the Leonard L Estate. Lands are circa one-half acre, being a triangular fraction just the Mountain Chief mine of the Butte Coalition Mining Co. Is de with a 3-compartment shaft. Property, though small, considered well and promising.

FLEMING-FOX MINING & SMELTING CO. NEW M

Mine office: Jicarilla, Lincoln Co., N. M. W. G. Fleming, presid general manager. Development is by shaft, with steam power.

FLINT STEEL MINE. MICH

Mine office: Greenland, Ontonagon Co., Mich. Lands, 400 acres, by the Mass and Adventure on the north and east, and by the Mich the south and west. Produced 415 tons, 458 lbs. fine copper and was by the Flint Steel Mining Co. and the Flint Steel Copper Co. Has t developed fissure vein in Ontonagon county, with 3 connected shaft since circa 1875.

FLOREDIA COPPER MINING CO. COLORADO & NEW M

Office: care of Financial Security & Trust Co., Denver, Colo. E. H president; C. A. Hubbard, vice-president; W. E. Kreamer, secretary. ized 1907, with capitalization $3,000,000, shares $1 par. Lands claime claims in the Floredia Mountains, Luna Co., N. M., and 3 cla miles west of Canyon City, Frémont Co., Colo., with total holdings of 9 Apparently was promoted by Financial Security & Trust Co., which sponsible for the Lost Bullion Spanish Mines, and other notorious s and company is regarded with much suspicion.

FLORENCE COPPER CO.

Mine office: Newhouse, Beaver Co., Utah. Lands, 4 claims, near t Amalgamated, slightly developed by tunnel.

FLORENCE SMELTING, MINING & MILLING CO. AR

Office: care of J. H. McCabe, president and manager, Phœnix, Ariz office: Price, Pinal Co., Ariz. Lands include the Mineral Hill group, Blue Bell, Alice and other properties, having lead and copper ores. C has a smelter, with a 35-ton lead stack, apparently moved from Ph Price, and was said to plan erection of a copper stack. Apparently idle since birth, and moribund.

FLYING DUTCHMAN MINING CO.

Dead. Presumably lands sold to Copper Jack Mining Co. Form Ibapah, Tooele Co., Utah.

F. M. & D. COPPER MINING CO. COLO

Office: care of Bernard McCaffrey, Denver, Colo. Letter retur claimed from former mine office, Morrison, Jefferson Co., Colo. Lan acres, patented, near Bear Creek, about 8 miles west of Morrison, op 600' of tunnels and a 165' main shaft, upper 150' passing through a capping of 15' to 30' width, carrying small gold values, and showing s of ore below, mainly sulphide, with some malachite, said to carry cir copper and $3.50 gold and silver per ton. Presumably idle.

FOLDAL COPPER & SULPHUR CO., LTD. NO

Office: 6 Old Jewry, London, E. C., Eng. Mine office: Foldal, Tro Norway. Alex Davidson, chairman; preceding officer, Lee Hoskyns, Stanle Sidney St. J. Steadman, Edw. W. Abrams, Henry A. Barton and E. E. B *directors; Chas. Forbes*, secretary; Pellew, Harvey & Fell, consulting en

and, mine manager. Organized Jan. 27, 1906, under laws of Great Britain, pitalization £350,000, shares £1 par, in 150,000 shares preferred and shares deferred stock. Company has invested circa £100,000 in prop- velopment and equipment. Lands, circa 3,000 acres, on the west bank Foldal river, carrying considerable timber, include 4 old mines, known Juliana Marie, Knutshovd, Grev Moltke and Grimsdal, worked for 0 years, and which produced circa 350,000 tons of ore, under former p. Mines, opened mainly by tunnel, show a vein of about 10′ average rrying massive cupriferous pyrite estimated to average 2% copper sulphur, ore being decidedly arsenical, vein giving every indica- ersistence. Ore, as produced, is divided into 3 classes, first aver- % copper and 48.17% sulphur, other grades carrying less copper and ss sulphur. Property also has some ore of high copper tenor that may become of considerable importance. Ore reserves, 1907, esti- 363,190 long tons. Has a good mining plant, installed at a cost and has expended about £8,000 for substantial mine buildings, includ- eral store.

ny has developed hydro-electric power from a large waterfall on a River, held under 25-year lease, subject to renewal, at rental of . Good wagon roads have been built at the mine, and a 22-mile ial tram, which is one of the longest in the world, has been built from to the Lille-Elvedal Railway, at a cost of £38,412, line having a f 40 tons per hour. Miscellaneous improvements include a telephone quay at Trondhjem, for ore shipments. Production, September, 1907, long tons, but was cut to about 1,000 tons monthly for last quarter wing to a miners' strike. Equipment has been provided for an ore- of circa 100,000 tons yearly. Property is decidedly promising, and nt seems vigorous and effective.

ANONYME DES FONDERIES ET LAMINOIRS. **FRANCE.**

office: Biache, St. Vaast, France. Property is an electrolytic cop- ion plant with five 6-kw. generators and 100 tanks, in multiple ar- , with estimated daily capacity of 2 metric tons fine copper.

PPER CO. **CALIFORNIA.**

office: Georgetown, El Dorado Co., Cal. Has highly auriferous s. Idle since circa 1903.

ILL CONSOLIDATED MINING & MILLING CO. **COLORADO.**

Bondholders foreclosed. Formerly at Tin Cup, Gunnison Co., Colo.

QUEEN COPPER CO. **NEW MEXICO.**

El Paso, Texas. Mine office: Silver City, Grant Co., N. M. H. president; M. D. Gaylord, superintendent. Lands, 10 claims, area known as the Cleveland group, 8 miles north of Silver City, in the s district, having a 700′ tunnel cutting 9 veins of 3′ to 70′ width, halcocite, associated with sphalerite disseminated in pyrite, giving says of 4.5% copper, 20% zinc and 10 oz. silver per ton. Plans a ent shaft. Has office and store buildings, and plans a mill at No. 1 tunnel, to make copper and zinc concentrates. Shipments, practically surface ores, gave returns of 11% copper and 8 oz. ton. Is said to plan a concentrator.

URKE MINE. **AUSTRALIA.**

office: Cobar, Robinson Co., N. S. W., Australia. Has a new plant, not giving entirely satisfactory results at last accounts, circa May,

LL MINING & MILLING CO. **IDAHO.**

office: *Pocatello, Bannock Co., Idaho.* E. E. Howson, superin-

tendent. Lands, 7 miles from Pocatello, are said to give a good sho
medium grade auriferous copper ore.

FORT HENRY MINING CO. AR

Office: care of R. G. Hourtienne, president, Pasadena, Cal. Le
turned unclaimed from former mine office, Wickenburg, Maricopa C
Geo. Dobbler, superintendent. Lands, in the Black Rock district, ha
shaft in a 2′ vein of ore assaying up to 25% copper.

FORT PITT COPPER CO. NEW M

Office: Curry Bldg., Pittsburg, Pa. Mine office: Clayton, Un
N. M. Jared Sater, president; C. L. Mohney, vice-president; W. H.
secretary; Dr. W. W. Wolfe, treasurer. Organized Jan. 22, 1907, under
Delaware, with capitalization $2,500,000, shares $5 par, being said,
press, to have been organized "to acquire mines of gold, silver, copper
etc." The Fort Pitt Copper Co. succeeded the Sater Copper Co., wh
ceeded the Copper Chief Mining Co., which in turn succeeded the Old
Copper Mining Co., all of the dead ones having departed this life acco
by the curses of deluded shareholders.

Lands, 27 claims, area 540 acres, also a 5-acre millsite, in the Blac
district, said to show 7 fissure veins in sandstone, of which 2, sligh
veloped, are claimed to be of 6′ average width, and to carry melaconit
chite, azurite and chalcopyrite, averaging 14% copper and 15 oz. sil
ton, which is a very serious exaggeration. Development is by shafts
and 225′, and by tunnels of 25′, 50′ and 300′, estimated by company
60,000 tons of ore, which estimate is excessive.

Equipment includes a 190-h. p. steam plant, with 2 hoists, and t
has 4 buildings and an 18x70′ mill. Company, by reason of its ba
cedents, is viewed with suspicion.

COMPAÑIA MINERA LA FORTUNA, S. A. M

Office: Aguascalientes, Ags., Mex. Mine office: Tepezalá,
Aguascalientes, Mex. Geo. B. Wardman, president and general mana
F. Westlund, vice-president; DeWitt Crevelling, secretary and tr
Alberto Pez, superintendent. Organized 1902, with capitalization 200,00
shares 100 pesos par. Lands include La Fortuna and adjoining mines,
2 tunnels and a 100-meter blind shaft, mines having a vertical depth
meters and greatest horizontal length of 600 meters of workings,
minly oxidized argentiferous copper ores of good average tenor in both
Has animal power, employing circa 200 men, and shipped, 1905, ab
tons of ore weekly.

FORTUNA COPPER CO. CALIF

Office and mine: Fortuna, Humboldt Co., Cal. P. J. Mulley, p
and general manager; Frank Legg, vice-president; C. A. Eastman, se
Fortuna Merchandising Co., treasurer; A. E. Purdy, superintendent. Or
June 8, 1901, under laws of California, with capitalization $70,000, sh
par. Lands, 32 claims, area 640 acres, in Trinity county, California,
by tunnels of 60′ and 270′, showing ores that have assayed 28% cop
$3 gold per ton, in veins of 12″ to 16″ width. Presumably idle.

FORTUNA GOLD & COPPER CO. AR

Office: J. B. Thompson, secretary and manager, Pittsburg, Pa.
office: Cave Creek, Maricopa Co., Ariz. L. E. Huddleston, president;
N. Whitney, vice-president; F. E. Miller, treasurer; preceding officers
H. Kinner, directors; Clarence E. Dresser, general superintendent. W
tically reorganized, 1907, and old management eliminated. Lands, 12
including the Scarlet mine, circa 28 miles north of Phœnix, said to
promising ore showing. Plans a 150-ton cyanide plant.

UNA GRANDE COPPER CO. **NEVADA.**
ad. Formerly at Ely, White Pine Co., Nev.

NA MINING CO. **MEXICO.**
ce: 274 Canal St., New York, N. Y. Mine office: Ahualulco, Jalisco, Frank E. Lloyd, manager. Property is the Candelaria mine, carrying us and argentiferous copper ore. Has steam power and a 15-ton mill Wilfley tables, employing about 25 men.

NA MINING CO. **MEXICO.**
ers returned unclaimed from former office, Bisbee, Cochise Co., Ariz., office, La Cananea, Arizpe, Sonora, Mex. Sold, 1907, to Fay-Cananea o., its holdings at La Cananea, but is said to have held a stockholder's Oct. 5, 1908, with a view to resumption.

A MINING CO. **UTAH.**
: care of George F. Richards, Jr., secretary and treasurer, Salt Lake h. Mine office: Lark, Salt Lake Co., Utah. Employs 45 men. Simon r, president; Sidney M. Bamberger, general manager; W. H. Rosserintendent. Organized March 10, 1904, with capitalization $300,000. rea 200 acres, adjoining the Ohio Copper Co., showing considerable ent.

ind shaft, starting from a tunnel, is planned to be deepened, on the operty is said to show a 4′ vein averaging 35% lead, 8 oz. silver and old per ton, also a 7′ vein averaging about 15% copper, but these are too high. Has a gasoline hoist and an old mill, which it is o equip with new concentrating tables. Property considered promis-

A MINING & MILLING CO. **UTAH.**
office: Bingham Canyon, Salt Lake Co., Utah. Property was under he Bingham Consolidated Mining & Smelting Co., and was operated corporation, hence presumably will be taken over by its successor, am Mines Co.

mine has silver-lead ores in the upper workings, with argentiferous ferous copper sulphides at depth, latter giving average assays of % copper, 8 to 10 oz. silver and $1.50 gold per ton. Mine carries a ive copper also.

pment includes electric power and a 100-ton concentrator. About 40 employed, when working.

E COPPER & FINANCE CO., LTD.
. Dissolved Feb. 20, 1906. Formerly had an office at 10 Basinghall on, E. C., Eng.

IVE CONSOLIDATED MINING CO. **WASHINGTON.**
. Lands sold to Magus Mining Co. Formerly at Silverton, Sno-o., Utah.

VER CONSOLIDATED COPPER CO. **WASHINGTON.**
: 315 American National Bank Bldg., Everett, Wash. Hon. Albert tire, president and general manager; E. A. Nickerson, vice-president; ith, secretary; Leighton Howard-Smith, treasurer; Milnor Roberts, g engineer. Organized Dec. 10, 1901, under laws of Washington, talization $2,000,000, shares $1 par. Lands, 18 claims, area 328 acres, -acre millsite and 40 acres timber lands, in the Foss River district county, Washington, opened by a 55′ shaft and tunnels of 35′, 45′, 310′, showing several veins, of which the largest, estimated at 180′ rries bornite and *chalcopyrite giving assays of 3 to 54% copper, 2 oz. silver and 80 cents to $44 gold per ton.* Management plans con-

tinuation of development work and installation of water power and a air compressor. Property considered promising and management good.

FOULD et COMPAGNIE. S

Office: Paris, France. Operating office: care of Don Guillermo Sui agent, Huelva, Spain. Mine office: Cazalla de la Sierra, Sevilla, Spain. erty includes La Cartagenera and other mines, undergoing development accounts. Presumably idle.

FOUR B'S MINING CO. COLO

Mine office: Turret, Chaffee Co., Colo. Property is the Jasper having auriferous and argentiferous copper ores. Presumably idle.

FOUR METALS MINING CO. ARI

Office: 21 South Center St., Phœnix, Ariz. Mine office: Wash Santa Cruz Co., Ariz. Lloyd B. Christy, president; Geo. H. N. Luhrs president; F. L. Blumer, treasurer; A. E. Turner, secretary; preceding W. H. Black and Levi Henry, directors. Organized 1903, under la Arizona, with capitalization $2,000,000, shares $1 par. Lands, 40 claim 680 acres, in 2 groups, known as the Gross and Phœnix-Hillside, lying of the Mowry mines, in the Patagonia district, opened by shaft and with circa 3,500′ of workings, showing ore giving fair assay values in lead, silver and gold. A test shipment from the Chamberlain tunnel Paso smelter gave net returns of $60 per ton. Management plans buil mill.

FOUR METALS MINING CO. CALIFO

Mine office: Keeler, Inyo Co., Cal. Lands, 35 claims, 8 miles from showing silver, lead, copper and zinc ores. At last accounts was deve water power on Lone Pine Creek, and had received part of material 8-mile aerial tram from mine to smelter. The Swansea smelter was built 1906, at Keeler, and removed later to Swansea, 3 miles north. Employed 40 men up to time of business depression in fall of 1907.

FOUR METALS MINING CO. COLO

Office: Equitable Bldg., St. Louis, Mo. Mine office: Telluride, San Co., Colo. Letter returned unclaimed from former mine office, Silverto Juan Co., Colo. W. Frank Carter, president; R. M. Scruggs, secretar treasurer. Organized Jan. 17, 1899, under laws of Colorado, with ca zation $2,000,000, shares $1 par. Lands were 47 claims, area 516 ac Silverton, San Juan county, and sundry claims, known as the Andrus in Ingraham basin, near Telluride. Had a mill at the Palmyra mine, steam plant at the Andrus. Presumably idle.

FOUR METALS MINING CO. U

Office: Salt Lake City, Utah. Mine office: Callao, Juab Co., Uta Hugo Brandeis, president; R. P. Hill, secretary. Lands, in the Dugw trict, carry auriferous and argentiferous copper, zinc and lead ores. M opened to depth of 400′ and has a small concentrator. Idle several year

FOURTH OF JULY MINING & MILLING CO. COLO

Mine office: Eldora, Boulder Co., Colo. Mine is opened by shaf has a 220′ tunnel, planned to cut the Olympic and Fourth of July veins which assays of 25 to 45% copper, some lead, 50 to 125 oz. silver, and $80 gold per ton, have been secured. Idle several years.

DUNCAN FOX y CA. C

Mine office: Cobija, Tocopilla, Antofagasta, Chile. Firm owns a number of copper claims, near Cobija and elsewhere, in the Tocopilla d of the province of Antofagasta. Presumably idle.

FOX COPPER MINING & MILLING CO. MONT

Office and mine: Mullan, Shoshone Co., Mont. W. J. Hughes, pres

. E. Wilson, vice-president; W. G. Newberry, secretary and treasurer; pre- ding officers, J. W. Brown, C. A. Adams, Geo. E. Hughes and W. S. Mor- reidge, directors. Lands, 9 claims, circa 6 miles east of Saltese, on which is planned to sink a shaft.

OCIÉTÉ FRANÇAISE DE ETUDIOS. **SPAIN.**

Office: Paris, France. Mine office: El Carpio, Cortegana, Huelva, Spain. Property is sundry old mines of cupriferous iron pyrites, leased from the Compañía de Minas Ferrocobrizas. Presumably idle.

COMPAGNIE FRANÇAISE DES MINES DE CUIVRE D'AGUAS TENIDAS. **SPAIN**

Dead. Succeeded by Société Française des Pyrites de Huelva. Formerly at Valdelamusa, Huelva, Spain.

COMPAGNIE FRANÇAISE DES MINES DE CUIVRE D'AKHTALA. **RUSSIA.**

Office: Rue Tronchet, 27 bis, Paris, France. Mine office: Alverdski, Bortschalo, Tiflis, Russia. Lands, circa 5 miles south of Tiflis, include ancient mines of auriferous and argentiferous copper and lead ores. Production, 1903, was approximately 2,000,000 lbs. fine copper. Presumably idle.

SOCIÉTÉ FRANÇAISE DES PYRITES DE HUELVA. **SPAIN.**

Offices: Rue de Chateaudun, 39, bis Paris, France. Mine office: Valde- lamusa, Huelva, Spain. Don Carlos Marchal, agent; Victor Prevost, superin- tendent. Organized December, 1899, under laws of France, with capitalization 2,000,000 francs, succeeding Société Française des Mines de Cuivre d'Aguas Tenidas. Lands include the Confesonarios mines at Valdelamusa, Perrunal and others at Cortegana, and El Carpio at Huelva, all carrying cupriferous pyrite low in copper tenor but of good sulphur average. Production, 1904, was 157,821 metric tons raw ore and 13 tons cement copper.

SOCIÉTÉ FRANÇAISE MINIÈRE ET MÉTALURGIQUE EN SERBIE. **SERVIA.**

Office: 147 Rue de Courcelles, Paris, France. Lands are sundry copper claims in Servia. Idle.

SOCIÉTÉ FRANÇAISE POUR L'INDUSTRIE ET LES MINES. **FRENCH CONGO.**

Office: 45 Boulevard Haussmann, Paris, France. J. Belmone, manager. Property is concessions covering a cupriferous district circa 200 miles from the coast in the French Congo, presumably in the Kouilou-Niari basin, on which some exploratory work was done, 1906-1907.

SOCIÉTÉ DES MINES ET FONDERIES DE FRANCARDO. **CORSICA.**

Office: 46 Rue de Londres, Paris, France. Mine office: Francardo Ajaccio, Corsica. L. Bizouarne, manager. Organized Oct. 30, 1905, under laws of France, with capitalization 3,600,000 francs, shares 100 francs par. Lands are extensive, including the Morosaglia, San Lorenzo and other old copper mines, claimed to carry an average of 7% ore, which probably is too high. Paid, 1906, a dividend of 10%.

ANDRES FRANCHY. **PERÚ.**

Mine office: San Marcelo, Yauli, Junín, Perú. Mine has argentiferous copper ores. Was a small producer at last accounts.

COMPAÑIA MINERA DE FRANCISCO DEL AZUL. **MEXICO.**

Mine office: Matehuala, Catorce, San Luis Potosí, Mex. Has copper ores, developed by tunnel. Idle.

FRANK HOUGH MINING CO. **COLORADO.**

Mine office: Lake *City, Hinsdale Co., Colo.* Organized 1907, under laws

of Colorado, by A. E. Reynolds, C. F. McKenna and D. Miller. Prope
the Frank Hough mine, on Engineer Mountain, carrying ore giving assa
to 27% copper, 47 oz. silver and $5 gold per ton. Property shipped s
hundred tons of high grade argentiferous copper ore under former owne

FRANKLIN JUNIOR MINE. MICHI

Owned by Franklin Mining Co.

FRANKLIN MINING CO. MICHI

Office: 60 Congress St., Boston, Mass. Mine office: Demmon, H
ton Co., Mich. Mill office: Point Mills, Houghton Co., Mich. Employ
men. Stephen R. Dow, president; Alvin R. Bailey, secretary and trea
Richard M. Edwards, superintendent; preceding officers, John C. W
Henry Tolman and Harry M. Howard, directors; Arno Jaenig, clerk; E
Warne, mill superintendent; Cyrus Truan and John Doney, mining ca
Organized Apr. 3, 1857, under laws of Michigan, with capitalization $5
reincorporated, 1887, for 30 years, and capitalization increased, lat
$2,500,000, shares $25 par. Has paid dividends of $1,240,000. Federal
Co., Boston, registrar. Annual meeting, third Wednesday in April.

Lands, 160 acres at the old Franklin, and 1,359 acres at the Fr
Junior, with surface rights to 160 acres additional, and a millsite at
Pointe, of nearly 200 acres area, with one mile of frontage on Portage
The old mine is the SW. ¼ of Section 2, Town 55 North, Range 33 Wes

The old Franklin mine, opened on the Pewabic bed, is surrounded o
sides by the Quincy, which has cut off the Franklin from following th
beyond the boundary lines. Parallel with the Pewabic lode and lying
300′ west, is the so-called west lode, which carries copper in variable
tities. Several fair stopes were developed thereon, 1905, and worked t
extent through the old openings. A little native silver is produced
Pewabic lode, which is picked out by boys at the stampmill. Min
almost exclusively scramming old ground and robbing pillars, the lower
having been gutted. The pillars removed are usually of fair grade, b
ground reworked varies greatly, ranging from very good to rock that is
barren. The old mine has been on its death-bed for 15 years, but co
to supply about 300 tons of rock daily, and predictions of imminent
have been proven false so frequently that it is unsafe to set any date
death. No. 3 shaft is 3,200′ and No. 5 is 2,850′ deep, both bottomed
Quincy line. No. 5 shaft, damaged by fire, March, 1908, has been re

The Franklin Junior mine, bought 1895, was opened, 1860, as the
& Boston, and was reopened, 1882, as the Peninsula. The Franklin
consists of two distinct mines on parallel beds, these being the old Alb
Boston mine, opened on the Allouez conglomerate, and an amygdaloid
opened 1896-1899, on the Pewabic lode, the Pewabic lying 475′ west
parallel with the Allouez conglomerate. The first work on the Franklin
was done on the Pewabic lode, which returned an average of only about
or 9 lbs. fine copper per ton of rock stamped, hence the amygdaloid
were abandoned, February, 1902, and work was transferred to the old
& Boston workings, the reopening of which was begun 1900.

The Allouez conglomerage averages 18′ to 22′ width, with an e
width of 30′, and 3′ to 5′ of lode rock of very poor grade is left unmi
hanging wall, very little assortment being attempted. The conglome
somewhat more regular in its copper contents than to the northward, w
is very bunchy at the Allouez, but is distressingly low in average grade
points.

No. 1 shaft of the conglomerate mine, size 7x20′ over all, with
measurement of 6′6″x18′6″, has 3 compartments and is 2,300′ deep.

is forked by a Cornish pump with 10′ lift, the largest of its size in the Lake district, which handles water very cheaply. The shaft has a wooden combination shaft-rockhouse, 40x50′ on the ground and 96′ high. A direct-motion hoist, good for 5,000′ depth, raises 6-ton skips.

No. 2 conglomerage shaft, 1,200′ south of No. 1, is 7x18'4" over all, and 1,200′ in depth, sunk 3′ under the footwall to secure solidity. Equipment includes a double-drum hoist good for 3,000′ depth, and a steel circular combination shaft-rockhouse, similar to that at No. 2 Centennial, built, 1906, by the Wisconsin Bridge & Iron Co.

In addition to the two conglomerate shafts opened, there is room for two additional shafts, one to the north and one to the south, on the same bed.

The Pewabic lode was tapped, circa 1906, by crosscuts from the conglomerate workings, on the 21st and 23d levels, and considerable drifting was done on the Pewabic bed, giving a rather encouraging showing. The Pewabic gave very poor results when worked formerly, but improved conditions in No. 7, the Mesnard shaft of the Quincy, and the decision of the Quincy management to sink the new Pontiac shaft, only about one mile south of the Franklin Junior, lends hope to the Franklin of better values at depth, and the Pewabic bed, while a very low grade proposition at the Junior mine, can be worked more economically than ten years ago. The Pewabic workings, reopened 1908, after 6 years idleness, were found in bad order. The amygdaloid shafts are numbered from north to south, and are sunk at an angle of 48°30′ on a lode varying from 3′ to 15′, and averaging about 9′ width.

The North amygdaloid shaft, about 900′ south of the Rhode Island line, is about 1,000′ in depth, and probably will be deepened.

No. 1 amygdaloid shaft, 1,100′ south of the north shaft, is 1,600′ deep.

No. 3 shaft, 1,500′ south of No. 2, is about 1,200′ deep.

No. 3 shaft, 1,100′ south of No. 2, was circa 400′ in depth when reopened July, 1908, and has been equipped with a wooden shafthouse and a temporary hoist. Drifting was begun on the 150′ level, August, 1908.

In addition to the Allouez conglomerate and Pewabic amygdaloid beds, the Franklin Junior tract carries the Mesnard epidote, Calumet conglomerate and Osceola and Kearsarge amygdaloids, all supposed to have been opened by a 975′ crosscut driven west on the Pewabic lode, many years ago, this crosscut showing several amygdaloid beds and one conglomerate carrying copper in small quantities. The formation was found considerably disturbed, and a crosscut at much greater depth might give better results. The Kearsarge lode is supposed to have been cut, 1906, by diamond drill borings, and also by a crosscut, but was found valueless where opened. Dr. L. L. Hubbard estimates, on data furnished by Reginald C. Pryor, that the Kearsarge amygdaloid should lie 1,308′ horizontally east of the Allouez conglomerate, which would indicate that the old 975′ crosscut, driven 1894, did not reach the Kearsarge lode. In consequence, the old crosscut was extended eastward, 1906, but the Kearsarge bed, or what is supposed to have been such, was not found to carry workable values, at that point and depth.

Surface equipment includes plants at the old mine and Franklin Junior. The former is adequate, but has not been added to for many years, in view of the ultimate exhaustion of the mine. Surface equipment at the Franklin Junior includes substantial and well equipped machine, carpenter and blacksmith shops, engine-houses, boiler-houses, warehouses, changing-house, office and a considerable number of substantial dwellings. There are air-compressors of 10, 12 and 36 drill capacities.

The mill, of steel, on stone foundations, 177x194′ in size, is reached by the Mineral Range railroad. Equipment includes 5 Allis-Chalmers 2-way heads,

with 20x24" cylinders, each capable of crushing 350 tons of conglomerate or 500 tons of amygdaloid rock daily. Each stamp is fed from a 1,000-ton rock bin, and equipped with hydraulic separators, which remove considerable heavy copper. The washing plant includes, for each head, 20 roughing jigs, 15 finisher jigs, round tables and 1 Overstrom table. The jigs are of the Hodge eccentric type, with center-shield copper discharges, obviating skimming. Foundations have been rebuilt under 2 old heads.

Power for the mill is furnished by a 16x32" Allis-Chalmers engine, with steam supplied by two 500-h. p. Stirling boilers, the boiler-house having a self-supporting brick-lined smokestack of 7' diameter, 165' high, on a 52' brick foundation. Water is furnished by a 15,000,000-gallon Allis-Chalmers vertical compound pump having 12x42" high pressure cylinders and 42x42" low-pressure cylinders, with 47" stroke and plungers of 37½" diameter. Water is drawn through a 36" pipe line, running 200' under the rock to a crib protected by quarter-inch screens. The mill has a 5x12" duplex fire-pump with fire-hose, and is lighted electrically. There is a 267' wharf at the millsite, with 18' of clear water alongside, equipped with coal hoists and sheds. The millsite has about 20 dwellings for employes.

The old mine works about 10 drills and the new mine 25, the old mine producing about 20% of the rock tonnage and 25% of the copper, showing that the rock from the old mine runs 14 to 15 lbs. fine copper per ton, while the conglomerate workings average under 11 lbs. The amount of mass copper secured is very small, averaging only about 1 pound per ton. Mineral is dressed to an average fineness of about 52% only, in order to save fine copper formerly lost in the tailings. Mining and milling costs, 1907, were $1.78 per ton, mining costs being $1.16 and stamping cost only 32.5 cents, notwithstanding the very refractory nature of the rock. These figures compare with similar costs of $1.76 per ton in 1903, notwithstanding increased wages and higher prices for supplies. Costs for 1907, including circa $20,000 for construction, were $740,595.65, being nearly 17 cents per pound, as against 15.4 cents in 1906; 15.8 cents in 1905; 15.4 cents in 1904 and 11.3 cents in 1903. The cost per ton of rock stamped was only 2 cents greater in 1907 than in 1903, while copper costs were nearly 6 cents more, the explanation being found in the steadily declining percentage of copper secured from the conglomerate mine of the Franklin Junior. In 1903 the extraction was 15.25 lbs. per ton from rock stamped, and in 1907 was only 11.48 lbs. fine copper per ton of rock stamped.

Production of fine copper has been as follows: 5,309,030 lbs. in 1903; 4,771,050 lbs. in 1904; 4,206,085 lbs. in 1905; 4,571,570 lbs. in 1906, and 4,401,248 lbs. in 1907. Production for 1908 probably will show a small loss from 1907, owing to transference of mining work from the conglomerate to the amygdaloid mine, at the Franklin Junior.

The matter of selling the old Franklin mine to the Quincy Mining Co. is under consideration, as is a tentative plan for the absorption of the Rhode Island mine and acquisition of 640 acres adjoining. The tentative plans call for an increase of capitalization to $5,000,000, and the issue of 45,000 shares of new Franklin stock, in payment for the Rhode Island property and one square mile of land from St. Mary's Mineral Land Co. Such a merger would give the Franklin company 2 miles of outcrop of the Pewabic and Boston & Albany beds, and nearly 2 miles of the strike of the Kearsarge lode. The management is vigorous, efficient and economical in the highest degree. The Junior mine, as developed, is so low in grade, on both the conglomerate and amygdaloid workings, that the only possibility of rendering it successful lies *in production* on a very large scale, and upon a most economical basis, but

deep workings of the Pewabic bed on the Junior are, without question, re promising than anything ever found in the upper workings.

MOUNTAIN COPPER CO. **NEW MEXICO.**

Formerly at Twining, Taos Co., N. M. Described Vol. VI.

RIVER COPPER MINING CO. **BRITISH COLUMBIA.**

r returned unclaimed from former office, 27 Market St., Camden, ine office: Kamloops, Yale district, B. C. Scott H. Richmond, mine Organized 1906, under laws of New Jersey, with capitalization , shares $1 par.

NITY COPPER CO. **NEVADA.**

220 Shukert Bldg., Kansas City, Mo. Letter returned unclaimed er mine office, Ely, White Pine Co., Nev. Organized under laws of vith capitalization $5,000,000, shares $1 par. Apparently was pro- I. W. Dumm. Lands, claimed to be 125 acres, advertised to be n the midst of Ely's great successes," which seems doubtful. Ap- o work done, and company viewed with suspicion as a mere stock- terprise.

CK WARDE GOLD & COPPER MINING CO. **NEVADA.**

returned unclaimed from former office, Salt Lake City, Utah. Mine oldsprings, Lincoln Co., Nev. Frederick Warde, president; A. W. secretary; Jacob Myers, treasurer. Organized March 1, 1904, with ion $300,000, shares $1 par. Lands are in the Yellow Pine district. pparently moribund.

D CONSOLIDATED MINES CO. **COLORADO.**

Was succeeded, 1904, by Freeland Development & Transportation rly at Freeland, Clear Creek Co., Colo.

D DEVELOPMENT & TRANSPORTATION CO. **COLORADO.**

and mine: Idaho Springs, Clear Creek Co., Colo. J. R. McKinnie, Jacob J. Elliott, second vice-president; Geo. E. Armstrong, secre- reasurer; Geo. E. McClelland, managing director; preceding officers, . Smith, Jr., Geo. L. Hibbs, John Trathen and John Riley, directors. May, 1904, under laws of Colorado, with capitalization $5,000,000, par.

165 claims, patented, area circa 500 acres, including the Freeland McClelland tunnel, also 30 acres of mill and smelter sites. The ed 1861, is extensively developed, on fissure veins in granite, and ave produced upwards of $4,000,000 in gold, silver, copper and lead, occurring as chalcopyrite. Ore is divided into 2 classes, smelting ng circa $25 and milling ore about $12 per ton in value. The main ' deep, is filled with water, and property is being reopened by the tunnel, of 3,600' projected length, planned to drain, ventilate and principal mines of the company, at depths of 1,300' to 3,000'.

D EXTENSION MINING & MILLING CO. **COLORADO.**

care of Dr. R. C. Warne, Mitchell, S. D. Mine office: Idaho ear Creek Co., Colo. N. L. Bras, president; Hon. Warren A. Hag- et agent; Jas. A. Wilson, superintendent. Lands, 4 claims, 7 miles Springs, having a 400' shaft showing ore carrying values mainly th considerable gold and some copper and silver. Idle since circa

D MERCANTILE & MINING CO. **COLORADO.**

Formerly at Freeland, Clear Creek Co., Colo.

COPPER MINES CO. **COLORADO.**

care of Standard Securities Co., St. Paul, Minn. Mine office: Cop- ment Co., Colo. A. J. Taber, general manager. Lands are near

Cotopaxi. Company said, April, 1908, to have ordered full equipment for mill.

FRÉMONT COPPER MINING CO. WYOMIN

Dead. Lands sold, circa 1907, to St. Joe Mining & Milling Co. Former at Riverside, Carbon Co., Wyo.

FRENCH-AMERICAN MINING CO. NEVAD

Mine office: Lane, White Pine Co., Nev. Louis Symon, general manag Lands include the Macon City group, 3 claims, near Lane, and the Douzet group, said to have produced circa 400,000 tons of lead ore, under a form management, ore so produced averaging 22% lead, 8 oz. silver and $2 gold p ton, with small and variable copper values. Property shows ore assaying to 25% copper, 11 oz. silver and $14 gold per ton.

FRENCH CREEK COPPER CO. PENNSYLVANI

Dead. Formerly at French Creek, Chester Co., Pa.

FRENCH CREEK MINING CO. WYOMIN

Letter returned unclaimed from former mine office, Centennial, Albany C Wyo. G. W. Morris, superintendent. Capitalization $1,000,000, shares $1 p Lands, near Centennial, show a 3′ to 4′ vein, with 12″ footwall paystre carrying high grade auriferous copper ore.

FRESNO COPPER CO., LTD. CALIFORNI

Office: 188 St. Vincent St., Glasgow, Scotland. Mine office: Cle Fresno Co., Cal. Sir John H. N. Graham, Bart., chairman; J. S. MacArth consulting engineer; C. E. Levett, Jr., mine manager. Organized Apr. 2, 19 under laws of Great Britain, with capitalization £400,000, and reorganiz under same title, Feb. 12, 1907, with capitalization £100,000, shares 4s. Lands, 480 acres, freehold and 1,880 acres leasehold, including the Blue F mine, full of water at last accounts, carrying a vein claimed to be 50′ w having 4 shallow shafts showing ore that was claimed to average 10% cop and $2 gold per ton. Honest sampling of the principal ore dumps gave a age assays of 1.04% copper and 13 cents combined gold and silver va per ton. Ore is cupriferous pyrite, apparently too low in grade to be rende payable under any process of extraction now in use.

In 1901 H. B. Vercoe bought, for about $12,000, a ranch in Fresno coun California, having an old 120′ shaft, called a copper mine. This ranch w made the basis of the £30,000 California Copper Syndicate, which, in Apr 1902, sold 80 acres to the Fresno Copper Co., Ltd., for £105,000 in fully p shares, company having £400,000 capitalization in shares of £1 par, which we to a premium of more than 100% on the market, giving a market valuati of nearly £1,000,000 for a property costing originally only about £2,400. the honest report of Fred Siebert, the shares fell from £2 to 2s. per share. T outcome gives a very sinister appearance to the actions of Vercoe, who w the original owner, promoter, vendor and managing director of this compa and who seems to have been an outright swindler. The moral is plain. "Lo the door before and not after the horse is stolen." Apparently property is little or no value.

FRIDAY & LOWDEN. CALIFORNI

Office and mine: Redding, Shasta Co., Cal. Property, on which abo $25,000 has been expended, is opened by tunnels. Idle several years.

SILBER- UND BLEIERZBERGWERK FRIEDRICHSSEGEN A. G. GERMAN

Mine office: Friedrichssegen an den L., Hessen-Nassau, Germany. Ma Rosenthal, president; C. Leuschner, superintendent, at last accounts. Pr *duction, 1903,* was 380 metric tons of argentiferous lead ore, carrying 62.43 *lead and 46.93* grams silver per ton; 5,524 metric tons of zinc ore, averagin

% zinc; 50.25 tons of spathic iron ore, and 8 tons of copper ore averaging
copper and 11.64 grams silver per ton.

CO CONTACT MINING CO. **UTAH.**

ffice: 209 Dooly Blk., Salt Lake City, Utah. Mine office: Frisco, Beaver Utah. D. P. Rohlfing, president and general manager; Patrick Ryan, vice-ident; H. S. Young, secretary and treasurer. Organized circa 1903, under of Wyoming, with capitalization $1,000,000, shares $1 par. One-half of apital stock is supposed to be pooled.

Lands, 18 claims, area circa 340 acres, adjoining the Horn Silver mine on northeast, carrying what is supposed to be the extension of the Horn Silver vein, which has been opened to a depth of 600' by a 2-compartment shaft, having 3 other shafts and several tunnels, with circa one-half mile of ings. Property also shows 4 contact deposits, between limestone and site, one ranging up to 150' in width, carrying values up to 20% copper, lead, 3% zinc, 45 oz. silver and 80 cents gold per ton.

Equipment includes a steam plant, with hoists of 50-h. p. and 80-h. p., a 4-drill air-compressor, with necessary mine buildings. The Horn Silver adjoining, has been a very large producer, and property is considered ining and development well-planned, though apparently as yet no im-ant ore bodies have been developed.

SCO MINING CO. **UTAH.**

Dead. Title changed, circa 1903, to Frisco Contact Mining Co. Formerly risco, Beaver Co., Utah.

ONTENAC COPPER CO. **MICHIGAN.**

Office: 12 Ashburton Place, Boston, Mass. Operating office: Calumet, Mine office: Eagle River, Keweenaw Co., Mich. Quincy A. Shaw, Jr., ident; Rodolphe L. Agassiz, vice-president; James MacNaughton, general ger; Geo. A. Flagg, secretary and treasurer; preceding officers and F. W. ewell, directors. Organized June 26, 1905, under laws of Michigan, with italization $500,000, shares $25 par. Is controlled, through ownership of stock issue, by the Calumet & Hecla Mining Co. At end of fiscal year, 30, 1908, company had cash and bills receivable, $5,894, with indebtedness 6,986.

Lands, 22,268 acres, in Keweenaw county, Michigan, lying mainly south west of the Maniton, with the old Central mine as the nucleus. The Cen-ine, worked 1854-1897, on a fissure vein, was a large producer for many and paid dividends of more than $2,000,000. Property also includes the ump mine, area 800 acres, in Town 59, Range 39, adjoining the Central. have been slightly prospected by diamond drill borings, but nothing of al value found. The tract, however, is very extensive, and, in view of pments elsewhere, it is altogether probable that payable mines will be d, eventually, on the holdings of the Frontenac.

AÑIA MINERA LA FRONTERIZA. **MEXICO.**

ine office: Lampazos de Naranjo, Décimo, Nuevo León, Mex. Property Buena Vista mine, carrying argentiferous chalcopyrite and sphalerite.

. FRONTON. **CHILE**

ned by Société des Mines et Usines de Cuivre de Chañaral.

A-KUMI & CO. **JAPAN.**

ice: 180 Dojima-Kitamachi, Osaka, Japan. Mine office: Kosaka-mura, -gori, Rikuchu, Japan. Denzaburo Fujita, chairman; Heitaro Fujita, airman; R. Tanaka, general manager; S. Saito, mine superintendent; machi, smelter superintendent. Organized 1875, under laws of Japan, pitalization £6,000,000. Profits, 1906, were estimated at circa $3,000,000. ing property includes the Kosaka and Towada mines, located in the

midst of high mountains, difficult of access. The Towada mine, opened A. 1670, has a vein of 30′ to 100′ width, carrying disseminated auriferous ch copyrite and argentite.

The Kosoka mine, located at the extreme northern end of the main isla of Nippon, 10 miles from the government railway, is an old silver mine, on apparently nearly worked out but proven, within the last few years, to con immense underlying masses of copper ore. Country rock is brecciated porphy tuff, ranging from a fine conglomerate to a coarse grit, with intrusions liparite and andesite, ore bodies occurring along the contact zone between th tuff and andesite as impregnations of tuff near a dacite contact, practically blanket veins, lying at an angle of about 45°, with diorite footwall and ha ing of andesitic tuff, the hanging-wall being sharply defined, but the ore sho ing imperceptibly into the footwall. There are 5 of these ore bodies, of i mense size, ranging from 20′ to 270′ in thickness, and proven to length one-half mile, while drill borings have proven the formation to continue to depth of 1,700′, with width, as shown by open-cuts, of 20′ to 140′. There is zone of mixed sulphides immediately under the hanging wall, averaging abo 2% copper, 10% lead, 10% zinc and 0.02 oz. silver, with a trace of gold, t gangue carrying 40 to 45% barium sulphate. Immediately below the mix zone is a zone of cupriferous pyrite, associated with more or less sphaleri carrying 1 to 2% copper only, succeeded by silicious ore of 1 to 1.5% copp tenor.

Ore is produced in 3 grades, the first averaging only about 2.25% copp 2 oz. silver and 65 cents gold per ton, with 12 to 18% zinc and 20 to 3 barite, causing difficult smelting. The second grade of ore is chalcopyrite, w pyritic gangue, comparatively free from zinc, but averaging only about 1.75 2% copper. The third grade is silicious ore, very low in copper tenor, b necessary as a flux, all three varieties of ore being charged as a self-fluxing m ture. Average of all grades of ore smelted is about 2% copper only, w small gold and silver values. The mine has fully $30,000,000 in gross val in sight.

The mine, discovered 1860, and opened 1864 for silver values, has been un the management of the present owners since 1884. Development is by 9 sha of 41′ to 221′ depth, and by 5 tunnels, of 250′, 714′, 1,084′, 1,212′ and 2,0 length.

Power is generated by a turbine water-wheel, only about 200 h. p. be used at the mine, owing to extraction being mainly by tunnel, about 200 h. used for miscellaneous purposes. There are two 8-drill Leyner air-compres Buildings include a foundry, of 1,538 square yards area, carpenter-shop 1,332 square yards, and boiler-shop of 812 square yards, all of wood and ir

The smelter, one mile from the mine, of about 1,000 tons daily capacity, one of the most complete in existence, having the very latest equip throughout. Ore is brought to the works by an aerial tram. Equipment cludes 8 Herreshoff calciners, of which 6 are used on ore, 1 on matte and 1 slags. There are 6 rectangular water-jacket blast-furnaces, of which 2 are u for matting, 2 for casting anodes, 1 for blister copper and 1 for ingot and c copper. Semi-pyritic smelting is employed, with fuel charges of only abo 2% anthracite. Product is a lead-copper matte containing about 20% copp which is crushed, roasted and resmelted in reverberatory furnaces to blis copper. The slag is essentially an iron and barium silicate.

Blister copper from the reverberatories is refined electrolytically, capacity of the refinery having been greatly increased in 1906. Product electrolytic copper of the exceptional purity of 99.95%.

The company owns and operates a private electric railway, of 8 m

length, equipped with 10 locomotives and 400 three-ton ore cars. The company also owns and operates 2 sawmills, and employs about 3,000 hands.

The Kosaka mine was under option, 1906, to an English syndicate, but, fortunately for the owners, the option was not exercised, and the property now is not for sale.

Production, 1906, of the Kosaka mine, was 14,811,152 lbs. fine copper, 2,594,004 grams silver and 290,772 grams gold, and in 1907 was 15,340,218 lbs. fine copper, 9,040,741 momme silver and 79,403 momme gold, copper production showing an increase of almost 50% in 4 years. The Kosaka, notwithstanding the extremely low average tenor of its ores, is the largest copper producer of Japan, and is owned by the strongest financial and commercial interests of the Empire. Not only is it the greatest copper mine of Japan, but it is one of the greatest copper properties of the world, in potential production, owing to the enormous size of its ore bodies.

FUKADA MINE. **JAPAN.**

Mine office: Fukada-mura, Kuma-gori, Higo, Japan. Country rocks are metamorphosed strata of sandstone and clay-slate of Paleozoic age, ore body having strike and dip corresponding to country rocks, and ranging 5′ to 10′ in thickness. Ore is chalcopyrite, associated with iron pyrites, and averages 5 to 6% copper. Production, 1900, was only 18,266 lbs. fine copper. Idle.

FUNATSU MINE. **JAPAN.**

Mine office: Funatsu, Yoshiki-gori, Hida, Japan. Has argentiferous copper ore and made circa 500,000 lbs. fine copper yearly when working. Idle.

FURNACE CREEK CONSOLIDATED COPPER CO. **CALIFORNIA.**

Office: 604-20 Broad St., New York, N. Y. Mine office: Greenwater, Inyo Co., Cal. O. A. Montgomery, president; Jos. A. Chanslon, vice-president; Col. J. S. Lankershim, treasurer; Maj. J. W. A. Off, secretary; preceding officers, A. Burcham and C. T. Silby, directors. Organized 1906, with capitalization $500,000, shares $5 par. Lands, circa 200 acres. Presumably idle.

FURNACE CREEK COPPER CO. **CALIFORNIA.**

Office: 506 Traders National Bank Bldg., Spokane, Wash. Mine office: Greenwater, Inyo Co., Cal. Patrick Clark, president; W. B. Matteson, vice-president; J. J. Stewart, secretary and treasurer; Abe S. August, assistant secretary; A. B. Harvey, general manager and mine superintendent; Jas. Hanley, foreman. Organized under laws of Washington, with capitalization $2,500,000, shares $1 par. Trust Company of America, New York, transfer agent. Guaranty Trust Co., New York, registrar. Shares are listed on the Spokane stock exchange.

Lands, 21 claims, 3 fractional, area 350 acres, 2 miles west of Greenwater, held by location, with no adverses, except in case of the three fractional claims. Mine has about 3,000′ of workings, No. 1, or Copper Blue shaft, being 500′ deep, with crosscuts on the 40′, 250′ and 500′ levels. Work was begun December, 1906, this being the pioneer mine of the Greenwater district, hauling supplies 125 miles from Las Vegas, then the nearest railroad point, and water from Furnace Creek, 25 miles.

Property shows 4 distinct ledges within a cross section of about 600′, with little copper in the country rock between, main ledge being andesite, with strike of circa N. 30° E., and dip of 75° E., outcrop not being especially prominent. Formation shows intrusive granite and porphyry, with cross dykes of later porphyries, nearly covered by a later flow of rhyolite, and faulted by northeast and southwest faults. Main ledge is reported to be about 200′ wide between walls, but apparently has shrank to width of 30′ to 50′ on the 250′ and 500′ levels, and at those depths is *effectually* leached of copper values, except for carrying *paystreaks, up to 3′ width,* and occasional bunches of rich

per ore, these frequently carrying good gold values, ores being melan cuprite, azurite, malachite, chalcocite and chrysocolla, 2 latter ores prod nating. Reports of large ore bodies opened in crosscuts were exagger The wide dyke is claimed to average about 4% copper throughout, but seems a very serious overestimate. Three 50-ton shipments to Salt L smelter returned 16.5 to 17.3% copper, with small gold and silver values. Tonopah Tidewater Railroad is now only 12 miles from Greenwater.

Equipment includes a 40-h. p. gasoline hoist and fan. An available sme site has been selected, but the mine has not shown sufficient ore to warr the building of even a small smelter. Working conditions are somewhat d cult, and development has proven decidedly disappointing. Predictions, Ap 1907, that production would begin immediately, were utterly unwarranted, the property, though by no means devoid of promise, has yet to prove that is a mine. Management considered competent.

FURNACE CREEK EXTENSION COPPER MINING CO. CALIFORNI

Office: care of Hon. John MacGinnis, vice-president, Butte, Mont. M office: Greenwater, Inyo Co., Cal. Geo. W. Irwin, president; R. B. Nucke treasurer; preceding officers, A. J. Campbell, Fayette Harrington, J. D. S mons, John M. Kirk, W. W. Cheeley, Harry Cunningham, E. H. Wilson W. E. Credon, directors; W. H. Teague, superintendent. Organized Sept. 1906, under laws of Montana, with capitalization $5,000,000, shares $5 p Lands, 13 claims, known as the Brady-Kempland group, adjoining the F nace Creek Copper Co., which have shown a little ore assaying up to 9.5 copper. Idle at last accounts.

FURNACE CREEK GOLD & COPPER CO. CALIFORNI

Mine office: Greenwater, Inyo Co., Cal. Organized 1906, by residents San Francisco and Goldfield. Lands, 5 claims, known as the Red Dog gro claimed to show a 20′ vein of copper ore.

FURNACE CREEK OXIDE COPPER CO. CALIFORNI

Office: care of W. J. Guthrie, president and treasurer, Butte, Mont. M office: Greenwater, Inyo Co., Cal. Harry M. Bradhurst, vice-president; Jo E. Corette, secretary; preceding officers, Carl H. Hand and A. J. Huncke, rectors. Organized circa October, 1906, under laws of Arizona, with capitali tion $5,000,000, shares $5 par. Lands, 6 claims, lying east of the Furn Creek Copper Co., showing copper stains and having a shaft of circa 100′.

FURNACE CREEK SOUTH EXTENSION COPPER CO. CALIFORNI

Office: care of L. M. Sullivan Trust Co., Goldfield, Nev. Mine offi Greenwater, Inyo Co., Cal. O. K. Kingsbury, vice-president; Larry M. Sul van, second vice-president; J. L. Lindsay, secretary; J. P. Harvey, consult engineer and director; A. J. Cleary manager. Capitalization $1,500,000, sha $1 par. Lands, 120 acres, including the Anxiety and Copper Shoe groups. the Copper Shoe pinching, the Anxiety became manifest. Has secured selec samples of ore assaying 5 to 30% copper. Promotion, by Shanghai Larry S livan, was marked by peculiar methods, though such methods are by no me peculiar to Sullivan. Is not regarded favorably. Idle and apparently moribu

FURNACE VALLEY COPPER CO. CALIFORNI

Office: Spokane, Wash. Mine office: Greenwater, Inyo Co., Cal. Pat Clark, president; W. C. Meyer, vice-president; J. J. Stewart, secretary treasurer; preceding officers, W. J. C. Meyer, Fred Birney and H. C. Wa field, directors; A. August, assistant secretary; W. J. Casey, superintend

Organized July, 1906, under laws of Washington, with capitaliza $6,250,000, shares $5 par. Trust Company of America, New York, trans *agent*. Shares are listed on the Spokane, Butte and Los Angeles stock

...ages. Company realized $52,525 from stock sales, 1907, and expended ...816, ending the year with 133,750 shares of stock unissued.

Lands, 8 claims, unpatented, circa 2 miles west and south of the Furnace ...ek Copper Co., showing 2 fissure veins, carrying carbonates assaying 4 to ...% copper in a gossan of 200′ claimed width, partly covered by alluvium. ...2 shafts, deepest 209′. Idle.

...UROKURA MINE. **JAPAN.**

Owned by Furukawa Mining Co.

...URUKAWA MINING CO. **JAPAN.**

Office: 1, Yayesucho, Kojimachi-ku, Tokio, Japan. Smelter office: Yama...to-gori, Akita-ken, Shimotsuke, Japan. Work offices: Kamitsuga-gori, ...chigiken, Japan, and Yanagiwaramachi, Honjyoku, Tokio, Japan. Mine ...es of the various properties are as follows: Ashio Mine, Kamitsuga-gori, ...chigi-ken, Shimotsuke, Japan; Ani Mine, Kitaskita-gori, Akita-ken, Ugo, ...pan; Kusakura Mine, Higashikanbara-gori, Niigata-ken, Echigo, Japan; ...kura Mine, Kazuno-gori, Akita-ken, Rikuchu, Japan; Nagamatsu Mine, ...himurayama-gori, Yamagata-ken, Uzen, Japan; Mizusawa Mine, Waka-gori, ...ate-ken, Rikuchu, Japan; Otori Mine, Higashi-Tagawa-gori, Yamagata-ken, ...pan; Kune Mine, Iwata-gori, Shizuoka-ken, Totomi, Japan; Innai Mine, ...chi-gori, Akita-ken, Ugo, Japan.

Junkiche Furukawa, president; R. Kondo, general manager; M. Otagawa, ...istant manager; K. Asano, consulting engineer. Organized 1905, as suc...r of Ichibei Furukawa.

Property includes 8 copper mines, 1 silver mine, a smelter, 2 copper works, ...al collieries and an extensive coking plant. The various mines are de...ibed, in detail, in the following paragraphs:

The Ashio mine, in the province of Shimotsuke, about 100 miles northwest ...Tokio, was discovered A. D. 1610, and developed by the Tokugawa govern...nt, reaching a productive capacity of 2,000,000 to 3,000,000 lbs. fine copper ...ly, during the latter half of the Seventeenth Century, rendering it one of ...largest, if not the largest copper mine, of that era, and as the output was ...cess of domestic demand, the surplus was exported to Holland. The mine ...into the possession of the late Ichibei Furukawa in 1877, in such poor ...dition that its yield was only about 400,000 lbs. of copper yearly, but, by ...d management and thorough development, coupled with the introduction of ...rn methods and machinery, was made the foremost copper mine of Japan.

The Ashio shows country rocks of Paleozoic clay-slate, sandstone and ...blende, with liparite intrusions, carrying literally hundreds of metalliferous ...s that traverse the lipartite, but thin out in the Paleozoic rocks. About ...veins are worked, these averaging 5′ to 6′ in width, with ore chutes of great ...gth, averaging nearly or quite 1,000′. There are 7 main veins, of 6′ to 7′ ...erage width, all with sharp dips, carrying a little melaconite and horn... ...h galena, sphalerite, arsenopyrite and pyrite, having a quartz and alum... ...ge, principal ore values being in the sulphides. Deepest workings ...′, and ores range up to 10% in copper tenor, though giving averages ... returns of only about 4% copper, with small silver values.

The Ashio mine is 9 miles from Nikko, the nearest railroad sta... ...are brought in tram-cars, hauled by bullocks, to the foot of the ... from Nikko, and transported thence to the mine by 2 aerial ... 19,500′ in length, having some very long and high spans ... of the mountains and descending on the other side to ... ...ating the trams is furnished by a plant with Pelton ... There also is a horse-tram connecting the different ... has steam, water and *electric power, there* ...

developing about 2,500-h. p., generated mainly from adjacent streams. T mine equipment is modern throughout, the machinery being mainly of Ame can and German manufacture. The mine has electric underground haulag and ore is broken mainly by power drills.

The reduction works at the Ashio include 3 concentrators, and a mill wi 25 gravity stamps. The bulk of the ore mined is concentrated to an avera tenor of 15% copper, though a little hand-selected ore of high grade go direct to the smelters.

The Ashio smelter, of 750 tons daily capacity, completed 1904, has 3 wate jacket blast-furnaces. The converter department has a 40-ton traveling cra 2 stands, 7 shells and a silica mill. The power plant has blowers for the bla furnaces and air-compressors for the converters.

The Ashio mine alone employs about 12,000 people, including forces at t copper mines, flux quarries, charcoal kilns, smelters, offices, etc. The for includes men, women and children, the females and children being employ at light labor only. Wages, while low according to western standards, a much higher than the average in Japan, miners earning 40 cents to $1 p day, and smelter men about 30 cents per day, while engineers, carpente smiths and other craftsmen are paid 50 cents to $1 per day, and boys and gi in the mills earn 10 to 25 cents per day. There were very serious labor troubl in February, 1907, leading to the burning of buildings, and rioting that w put down by troops. Wages were raised in 1907. Production of the Ashio mi has shown little change for the past 5 years, having been 15,267,210 lbs. fi copper in 1903, 14,622,000 lbs. in 1904; 14,820,192 lbs. in 1906 and 13,972,4 lbs. in 1907.

The Ani mine, Shigeo Kasai, mine manager, is a group of ancient pro erties in the province of Ugo, modernized about the beginning of the centur The Ani carries auriferous and argentiferous copper sulphides, associated wi argentiferous galena, considerable silver being secured as a by-product. Equi ment includes steam, water and electric power, with a very good modern mi ing and reduction plant. The works have a 10-stamp mill and a 150-ton smelte with about 2,500 employes. Production, 1903, was 2,089,279 lbs. fine copp and 1907 was 2,737,011 lbs.

The Kusakura mine, S. Gamoh, manager, in the province of Echigo, opera in the Eighteenth Century, was bought by the predecessor of the present co pany in 1870. The property shows 4 nearly parallel main veins, of less tha 12" average width, though occasionally widening to several feet, traversi porphyry and andesite, the upper workings showing cuprite and bornite, su ceeded by chalcopyrite, associated with pyrite and galena, in the lower level principal values being in the sulphide ores. Equipment includes steam an electric power, and a small smelter, making blister copper of 98.5% averag tenor. About 1,000 hands are employed. Production, 1903, was 1,244,723 lbs and in 1907 was 1,012,043 lbs. fine copper.

The Furokura mine, in the province of Rikuchu, was discovered A. D 1762, and operated 1765-1794, remaining idle until 1868, when reopened. Th property has numerous veins traversing andesite, carrying chalcopyrite, asso ciated with pyrite, hematite and occasional galena and sphalerite, with a cla gouge. Production was 601,199 lbs. in 1903; 746,605 lbs. in 1906, and 656,3 lbs. fine copper in 1907.

The Nagamatsu mine, in the province of Uzen, shows rocks of Tertiar tuff and shale, traversed by andesite dykes, carrying numerous veins, mainly parallel, with nearly north and south strike and steep dip to the east. Th Okubi, which is the main vein, has an average width of 6" to 12" only, wit *maximum of 24"*, carrying chalcopyrite associated with pyrite and occasion

halerite, with quartz gangue. Production, 1907, was 603,514 lbs. fine copper and 101,020 momme silver.

The Mizusawa mine, in the province of Rikuchu, has two 3' veins, at the junction of granite and liparite, carrying chalcopyrite with quartz gangue. Production, 1907, was 490,047 lbs. fine copper.

The Kune mine, in the province of Totomi, opened A. D. 1726, has 3 beds of ore, the upper of 100' thickness, the middle of 12' and the lowest of about 7' average thickness, latter split into two 2' seams at the bottom. Ore is chalcopyrite, associated with pyrite, the richer portions averaging 6 to 7% in copper tenor. Production, 1898, was 137,686 lbs. fine copper, and for 1906 output was given by company as circa 37,000 tons of copper ore.

The Otori mine made, 1904, circa 187,000 lbs. fine copper, and in 1907 produced 261,902 lbs. fine copper and 66,791 momme silver.

The Innai mine, near the southern boundary of the province of Ugo, was discovered A. D. 1696, and about the beginning of the Nineteenth Century became important, silver production rising to about 100,000 momme monthly, circa 1840. The mine fell into the hands of Ichibei Furukawa in 1882. The property shows augite-andesite and propylite, having numerous veins ranging from 2' to 20' width, carrying chalcopyrite, pyrargyrite, argentite and stephanite, with quartz gangue. A second vein, of 1' to 4' width, carries similar ores in connection with galena, sphalerite and pyrite, while a third vein carries chalcopyrite, galena and sphalerite only. Property, while called a silver mine, is an important producer of copper, with considerable gold values, production, 1907, having been 568,480 lbs. fine copper, 1,206,846 momme silver and 20,193 momme gold.

In addition to its metalliferous mines, the company operates extensive coal mines, known as the Western Collieries, at Kaho-gori, Fukuoka-ken, producing about 350,000 tons of coal yearly, and operates coal mines also at Kazuno-gori, Rioshiknsho, Echigo. The Fukagawa coke works, at Minimakatashika-gori, Tokio, are of about 16,000 tons annual capacity.

The Shinonome smelter, at Yamamoto-gori, Akita-ken, has an annual capacity of about 2,000,000 lbs. ingot copper, and 225,000 lbs. pig lead, also turning out small quantities of gold and silver.

The Nikko copper works, at Kamitsuga-gori, Tochigi-ken, is a refinery, making about 8,000,000 lbs. of electrolytic copper yearly.

The Honjyo copper works, at Yanagiwaramachi, Honjyoku, Tokio, has an electrolytic refinery, but is devoted mainly to the manufacture of sheets and wires, having an annual capacity of about 9,000,000 lbs., and turning out about 500,000 lbs. yearly of copper wire, 550,000 lbs. of electrolytic copper, and circa 3,300 lbs. fine silver.

The management of the Furukawa Mining Co. is noted for its progressiveness, and responsible heads of departments are encouraged to travel, at the company's expense, through the principal mining and metallurgical centres of Europe and America, thus keeping the company fully abreast of international progress, in every branch of its business. Production, 1905, was 23,780,573 lbs. fine copper and 1907 was 20,302,378 lbs. fine copper.

FUTURITY MINING & MILLING CO. **COLORADO.**

Dead. Formerly at Newett, Chaffee Co., Colo. Described Vol. VI.

COMPAÑIA GADITANA DE MINAS. **SPAIN.**

Office: Cadiz, Spain. Mine office: Aznalcóllar, Sevilla, Spain. Capitalization, 3,000,000 pesetas, shares 500 pesetas par; debentures, 2,000,000 pesetas authorized. Marquis de Fiel Pérez Calixto, president; Don José Luis Lacave, treasurer; Don Salvador Viniegra, *secretary. Property is* La Caridad group of mines, *carrying large bodies of cupriferous pyrites, with considerable develop-*

ment. Company built and owns a 34-kilometer railroad, from Azualeólla the Guadalquivir river. Management considered good and property promi

GAGNON MINE. MONTA

Owned by Trenton Mining & Development Co.

GALENA BAY MINING CO. ALAS

Office: 402 Railway Exchange Bldg., Chicago, Ills. Mine office: Val Prince William Sound, Alaska. Benj. F. Millard, president; C. A. Hay, v president; L. J. Rusk, treasurer; Albert Barge, secretary; John S. Jury, as ant secretary. Organized under laws of Washington, with capitaliz 500,000, shares $1 par. Lands, on Galena Bay, 3 miles from tidewater about 35 miles from Valdez, include the Vesuvius group of 25 claims, under bond and lease, having a 1,000′ tunnel, the Mullen group of 6 cla and 12 miscellaneous claims in the Kotsina Valley, the Mullen group being Copper Creek, also a 1,300-acre townsite. Company plans a hydro-elec power installation, to transmit energy 2 miles to the Vesuvius mine, and said to have ordered a 1,700′ Leschen aerial tram.

GALENA COPPER MINING CO. WASHINGT

Office: 115 Marion St., Seattle, Wash. Mine office: Index, Snohom Co., Wash. L. E. Rader, president; H. M. Williams, vice-president; John Snook, secretary; Francis X. Waldron, treasurer; Judson C. Hubbart, mana Organized Jan. 2, 1906, under laws of Washington, with capitaliz $1,000,000, shares $1 par.

Lands, 16 claims, in the Silver Creek district, showing mainly chalc rite, in veins of 3′ to 18′ width, said to have given assays of 18.5% cop 2.9 oz. silver and $4 gold per ton. Development is said to be by tunnel, a shipment of ore to the Tacoma smelter is said to have given net retur $30 per ton. Management is said to expect a railroad within one-half of the mine. Presumably idle.

GALENA MINE. BRITISH COLUM

Mine office: Howe Sound, New Westminster district, B. C. J. H. S manager, at last accounts. Lands, sundry claims about 6 miles south of Britannia mine, located one-half mile from tidewater, on Howe Sound, op by a 100′ tunnel on a 5′ vein of copper ore. Idle.

GALENA RIDGE MINING CO. WYOMI

Mine office: Meteetse, Big Horn Co., Wyo. Lands, circa 1,200 a patented, also timber lands and water-rights, showing 5 veins of good w on one of which the 450′ Oregon tunnel shows ores carrying copper, lead, s and gold values, with quartz gangue. Small sample shipments to Denver said to have given good returns. Development is by a 1,400′ crosscut tu planned to be driven about 5,000′. Has a Pelton water-wheel and 10-drill compressor. Idle.

GALICE CONSOLIDATED MINING CO. OREG

Dead. Formerly at Galice, Josephine Co., Ore.

GALIZURSKI WORKS. RUS

Mine office: Galizursk, Elizabethopol, Russia. S. Varavov, owner. L recorded production, 1899, was 1,390,095 lbs. fine copper. Presumably idle.

GALLAHER MINING & MILLING CO. WASHING

Office: 705 First Ave., Seattle, Wash. Mine office: Cle Elum, Kittitas Wash. Edward Peterson, managing agent. Organized under la ington, with capitalization $2,000,000, shares $1 par. Lands, 200 acres, showing copper ledges, also a vein of cinnabar c in mercury. Development is by a 70′ shaft on the Copper *tunnels of* 380′ on the Last Chance, 310′ on the Copper *Navidad and* 120′ on the Dolphin. Company claims a 3′

r, a 4' vein on the Last Chance, and a 3' vein on the Copper King. 0 has been expended on development. Idle.

COUNTY BASIN COPPER MINING CO. MONTANA.
l mine: Bozeman, Gallatin Co., Mont. Organized January, 1906, f Montana, with capitalization $100,000. Presumably idle.

MINE. MONTANA.
y Anaconda Copper Mining Co.

OPPER CO., LTD. NORWAY.
1 Gresham House, London, E. C., Eng. Mine office: Karlsö, way. H. Godber, secretary; Blackmore, Howard and Tazewell, ers. Organized Oct. 12, 1901, under laws of Great Britain, with 5,000, shares £1 par. Property is mining claims and rights on

PENNSYLVANIA.
Gap, Lancaster Co., Pa. Has nickeliferous and cupriferous somewhat similar to the ore of the Sudbury district of Ontario, and ipal American nickel producer for two decades. Idle since 1893.

GARCÍA. MEXICO.
Galeana, Chihuahua, Mex. Jesús Ontiveros, manager. Prop- ía mine, carrying auriferous and argentiferous copper ores. Has and a 20-ton mill with 1 Blake crusher. Employed circa 50 men

WORTHEN & GOSS CO. ARIZONA.
l works: Tucson, Pima Co., Ariz. B. L. Worthen, general man- a smelter with 28-inch experimental water-jacket blast-furnace, California petroleum, tests of which were said to be satisfactory.

NORTH CAROLINA.
rations reclaimed from former mine office, Jamestown, Guilford ine is opened by a 130' shaft, showing cupriferous iron pyrites in ging from a few inches to 3' in width. Idle for many years.

MEXICO.
Puente Alvarado 17, Mexico, D. F. Mine office: Placeres del Guerrero, Mex. Lawrence F. Bedford, president; A. H. Stockdale, ico, opened for gold, has silver-lead and auriferous copper ores. ers and employed circa 150 men at last accounts.

UTAH.
Provo & Brigham, Box Elder Co., Utah.

MONTANA.
ation reclaimed from former office and mine, Butte, Silver Bow ; Box 1, president; E. C. Stettheimer, treasurer and general man- ated June 5, 1906, under laws of Montana, with capitalization per; Lincoln, 2 claims, near the St. Lawrence mine and ad- ine on the west. Has a 180' two-compartment shaft. Idle and

WYOMING.
Mich. Mine office: Encampment, E. C. Griffith, president; T. J. Upjohn, vice-president; ; and treasurer; prospecting officers, E. S. Drury, O. F. E. Bullock, directors. Organized July 10, 1902, under laws ; 1,000,000 shares, $1 par; issued, $700,000. Butte Location, having a 40' shaft ; 300' maximum width,

carrying a hematite gossan, supposed to be a continuation of the Itma
Idle.

GARNET GOLD MINING CO. MON

Mine office: Pony, Madison Co., Mont. E. L. Ballou, manager. Has erous and argentiferous lead and copper ores with water power and 20 mill, copper values being secured as a by-product. Employs about 40 me

GARRETSON-SAHUARIPA CO. ME

Office: Ellicott Square Bldg., Buffalo, N. Y. Mine office: Sah Sonora, Mex. Samuel E. Garretson, manager. Mine, opened by shaft, to have a fair showing of high grade auriferous and argentiferous copp Has a steam plant, 50-ton mill and 50-ton Garretson pyritic furnace. P ably idle.

GARRISON GOLD & COPPER MINING CO. U

Dead. Merged, 1907, in Garrison Monster Mining Co. Formerly at I Tooele Co., Utah.

GARRISON-MONSTER MINING CO. U

Office: Salt Lake City, Utah. Mine office: Ibapah, Tooele Co., Uta P. Gardner, president; J. S. Garrison, vice-president; S. W. Morrison, trea H. B. Windsor, secretary. Organized under laws of Nevada, with talization 1,000,000 shares, presumably $1 par, as a merger of the Ga Gold & Copper Mining Co. and Monster Mining Co. Lands, on Dutch tain, in the Clifton district, circa 40 miles from Wendover, the nearest ra station, have about 3,500′ of workings, said to show considerable bodies ver-lead ore.

GARVANZA MINING & MILLING CO. CALIFO

Mine office: Cima, San Bernardino Co., Cal. J. M. Banfield, superi ent. Lands, on the western side of New York Mountain, near Bryant st on the Salt Lake Railroad, have about a quarter mile of workings, sh considerable auriferous and argentiferous copper and lead ore. Plans ton mill and reduction plant, with four 10-ton tanks to use the hyposu leaching process.

COMPAÑIA DE MINAS i FUNDICIONES DE GATICO. C

Dead. Succeeded, March 10, 1905, by Compañía Minera de Gatico. merly at Gatico, Cobija, Antofagasta, Chile.

COMPAÑIA MINERA DE GATICO. C

Office: Casilla 627, Santiago de Chile. Mine and works office: G Cobija, Antofagasta, Chile. Geo. W. Waters, manager. Organized Mar 1905, under laws of Chile, with capitalization 6,000,000 pesos, shares 100 par. Property includes El Toldo, Michilla and Gatico mines, latter o 1891. La Michilla group, 6 kilometers north of Michilla Cove, at an elev of 3,000 meters above sea-level, has bedded veins with pockets of oxidize carrying 5 to 6% copper, though tenor of ore can be brought up to nearly by selection. El Toldo mine, 4 kilometers northeast of the smelter, nearly vertical fissure vein of about 1 meter width, opened to depth o meters, carrying 7% chalcopyrite with quartz gangue. Production of El 1904, was circa 10,000 metric tons of selected ore averaging 10.5% copper El Toldo mine is connected with the smelter by a Ropeways Syndicate tram, 3,700 meters long, with drop of 200 meters, permitting operatio gravity, and reducing cost of ore transportation to smelter from former of 4.5 pesos to one-half peso per metric ton, effecting a saving of about pesos yearly. Also has a 5½-kilometer Bleichert aerial tram from Mi mines to Michilla Cove, operated by gravity, whence ores are shipp smelter.

Smelter, at the port of Gatico, 30 miles south of Tocopilla, and 83

uth of Antofagasta, has reverberatory furnaces and a 38x144" Allis-Chalmers blast-furnace. Converter department has pneumatic stands and 5 cylindrical shells, with an Allis-Chalmers duplex air-compressor and a 110-h. p. electric motor. Power plant includes two 200-h. p. boilers, Green fuel economizer and dynamo with capacity of 13 arc and 150 incandescent lamps. Water is re-used, works having a reservoir of 50,000 cubic meters capacity. Fuel is imported coke, slags averaging 0.5% copper. Smelter costs at old plant were 21.5 pesos per metric ton, and in the remodeled plant are 12.61 pesos per ton. Company also has an old smelter at Michilla Cove, running intermittently, this having a 36x84" water-jacket blast-furnace, 2 reverberatories and a converter plant. Production, 1903, was 2,565,503 lbs. fine copper, and for 1907 should have been nearly or quite 4,500,000 lbs. fine copper.

GAVILANES MINING & MILLING CO. **MEXICO.**

Office: 819 Chamber of Commerce, Chicago, Ills. Letter returned unclaimed from former mine office, Gavilanes, Durango, Mex. C. A. Wightman, president; John A. Boland, secretary and treasurer; James E. Boland, manager. Organized Sept. 1, 1904, under laws of Arizona, with capitalization $2,000,000, shares $1 par. Lands, 500 acres, 30,000 acres of timber and grazing lands, and water-rights to 10 miles of the Piaxtla and Pilar rivers. Lands include the old Gavilanes silver mine, a property said to have produced, according to official records, 80,000,000 oz. silver, also sundry undeveloped copper veins. Idle.

SUCESIÓN FRANCISCO GEISSE. **CHILE.**

Office and mines: El Espino, Combarbalá, Coquimbo, Chile. Property includes El Espino mine, opened 1896, which made about 100,000 lbs. fine copper yearly when working, and the Fundición El Pupio, a small smelter. Idle.

GEISSE HERMANOS. **CHILE.**

Office and works: Illapel, Coquimbo, Chile. Mine office: Mineral de Bella Vista, Illapel, Coquimbo, Chile. Property includes Los Trabos, Bella Vista and Tongo mines. The Bella Vista mine is about 150 meters deep, with workings for about 150 meters in horizontal length. The Tongo mine, at Mineral de Tongo, Illapel, has a vein of 2 to 3 meters width, opened to depth of 160 meters, and, 1903, employing 90 men, produced 900 metric tons of ore averaging 9% copper and 25 grams gold per ton. The Trabos mine in the same year produced 720 metric tons of ore of 20% copper tenor. Has a smelter with blast and reverberatory furnaces, producing ejes of circa 50% copper tenor and bars of 97% tenor. Production, 1903, was 603,919 lbs. fine copper.

GEM CONSOLIDATED MINES CO. **COLORADO.**

Office: 341 Sixth Ave., Pittsburg, Pa. Mine office: Idaho Springs, Clear Creek Co., Colo. Col. J. M. Guffey, president; John H. Galey, vice-president; W. S. Watson, secretary; Henry B. Clifford, resident director; W. E. Renshaw, general manager; J. Kaughman, mill superintendent. Organized Jan. 1, 1907, under laws of Colorado, with capitalization $3,000,000, shares $1 par. Lands, 10 claims, patented, also a millsite, showing a vein of 20′ to 50′ width, traceable circa 3 miles, carrying sulphide ores assaying up to 37% copper, 10 oz. silver and $18 gold per ton. Mine has about 5 miles of workings, estimated to show 1,000,000 tons of ore, with 300,000 tons blocked out for stoping. Has a 350-h. p. hydro-electric plant, using 350 h. p. at the mine and 200 h. p. at the mill. Has 4 hoists, good for 3,000′ depth, and an 18-drill Ingersoll-Rand air-compressor. Buildings include a 40x50′ machine shop, carpenter shop, smithy, etc., and a 100-ton stamp mill. Production, 1907, estimated by company at circa $150,000 in value.

GEMINI-GODIVA CONSOLIDATED MINING CO. **UTAH.**

Office: Salt Lake City, Utah. *Mine office: Eureka, Juab Co., Utah.* John Q. Packard, *president; Jackson C. McChrystal, general* superintendent. Was a

merger of the Gemini and Godiva mining companies, the Gemini having about $300,000 in dividends. Mine, opened to depth of 1,600', has a ve 15' to 20' width, carrying auriferous and argentiferous lead and copper the silver-lead ores averaging 12% lead and 40 oz. silver per ton, whil bottom level shows argentiferous copper ore of about 3% copper tenor. duction averages circa 1,500 tons of ore monthly, mainly silver-lead ores under a long-term contract to the United States Smelting & Refining Co. steam and water power, employing circa 75 men.

GEMINI MINING CO. U

Dead. Merged, circa 1906, in Gemini-Godiva Consolidated Minin Formerly at Eureka, Juab Co., Utah.

GEM MINE. MONT

Owned by North Butte Mining Co.

GEM TURQUOISE & COPPER CO. NEW ME

Office: 37 Maiden Lane, New York, N. Y. Mine office: Silver City, Co., N. M. Property is a turquoise mine, in the Burro Mountains. Idle.

GENERAL COMPANY OF SPANISH MINES, LTD. SP

Office: 70 Queen Victoria St., London, E. C., Eng. Mine office: tegana, Huelva, Spain. T. Greenhill, secretary. Organized March 9, under laws of Great Britain, as Telesforo Copper Co., Ltd., with capit tion £50,000, shares £1 par; issued, £10,750; name changed, June, 19 present title. Lands are El Telesforo and La Segura mines. Presumably

GENERAL DEVELOPMENT CO. U.

Office: 42 Broadway, New York, N. Y. Mine office: Butte, Silver Co., Mont. Adolph Lewisohn, president; J. H. Susmann, secretary and urer; J. Parke Channing, engineer; preceding officers, A. Ruhlender, V Nichols, J. Langeloth, Samuel Untermeyer, A. Lehman, Herman Sielcke M. Hyman and H. M. Davis, directors.

Organized 1906, under laws of Delaware, with capitalization $2,00 shares $100 par. Is controlled by the Lewisohn interests and operated close corporation. Controls, through stock ownership, the Montana Co dated Mining Co., Colorado Gold Dredging Co. and Miami Copper Co., interests in Montana, Colorado, Arizona, Canada and Mexico. Is suppos hold the Keystone property, at Globe, Arizona, under option. The copper erties are described separately, under their respective titles.

GENERAL DEVELOPMENT CO. OF ARIZONA. ARIZ

Office: P. O. Box 1052, Globe, Gila Co., Ariz. H. E. Kelly, president A. Bordeaux, vice-president and general manager; J. H. Connell, secr Organized June 8, 1907, under laws of Arizona, with capitalization $1,00 shares $10 par, to do a general mining, development and promotion busin

GENERAL GRANT MINING CO. COLOR

Dead. Formerly at West Creek, Douglas Co., Colo.

GENERAL MINES CO. MONT

Office: 23 Broad St., New York, N. Y. Letter returned unclaimed former mine office, Helena, Lewis & Clark Co., Mont. Geo. Hyatt Rob president; Walter B. Tipton, vice-president; F. J. Chipman, secretary treasurer; B. Frank Johnston, manager. Lands, in Avalanche Gulch, acro Missouri river from Helena, have a 28' vein, opened by a 500' crosscut t showing auriferous and argentiferous copper sulphides.

GENESEE COPPER CO. CALIFO

Mine office: Genesee, Plumas Co., Cal. Lands, 33 claims. Idle circa April, 1906.

GEORGE A. TREADWELL MINING CO. ARIZ

Office: 27 William St., New York, N. Y. Mine office: Mayer, Ya *Co., Ariz.* F. W. Wood, president and general manager; Miss Myra B. M

secretary; Frank W. Giroux, superintendent. Organized February, 1900, under laws of West Virginia, with capitalization $3,000,000, increased, Jan. 21, 1905, to $3,500,000, shares $10 par. Was organized by "Gen." Walter S. Logan, "Prof." Geo. A. Treadwell and others. First act of company was illegal, being the purchase, from directors, who voted for such purchase, of sundry mining claims. Controls the Brookshire Mining Co., through ownership of 80% of stock. Has upwards of 2,000 shareholders, of whom 1,410, in August, 1907, were holders of 50 shares or less, more than half being women, duped by this gang of thieves. Annual meeting, first Wednesday in February.

Lands, formerly reported as 102 claims, patented, area 1,861 acres, were reported by the company, Apr. 10, 1906, as 60 claims, patented, area 1,200 acres, with 180 acres of mill and smelter sites, in the Jerome, Big Bug, Peck and Agua Fria districts. These lands were reported to include the Brookshire, Hackberry, Boggs, Iron Queen and Cliff mines, and previously included also the Badger, Pastime, Crystal, Wallace and Agua Fria groups. Country rocks are Yavapai schists and slate, with rhyolite intrusions, ore bodies occurring mainly as replacements in slate, following the rhyolitic intrusions. Five ore bodies have been developed, to various extents, these, of about 5' average width, formerly having been claimed by the company to give average assays of 5% copper, 5 oz. silver and $5 to $50 gold per ton, from chalcopyrite, but claimed, 1906, by the company, to give average assays, from bornite and chalcopyrite, of 3% copper, 10% zinc, 5 oz. silver and $2 gold per ton, which ores, by reason of low contents in copper, gold and silver, and excess of zinc, are of small value.

Various mines are developed by shafts of 485', 350', 375' and 100', and by tunnels and drifts of circa 7,700' aggregate length, with numerous shallow shafts and short tunnels.

The Brookshire group, which has the principal development, has upwards of one-half mile of workings, showing considerable concentrating ore of 4 to 5% copper tenor, with fair gold and silver values. Work was abandoned on this property in 1902. The Hackberry mine, opened to 500' depth, has nearly one-half mile of workings, on 2 parallel veins of 7' and 9' claimed width, former claimed to carry ore averaging 10% copper and $10 gold per ton, which is untrue. The Boggs and Iron Queen mines have considerable development, as also has the Cliff, on which work was abandoned in 1902. Mines, as a whole, are estimated by the company to show 80,000 tons of ore, with 40,000 tons blocked out for stoping, which, although a considerable decrease from former claims, is a gross exaggeration. Practically all of the company's statements regarding high ores and large ore bodies are fairy tales. The Boggs mine, which is idle, is held subject to a mortgage of $150,150.40, which never will be paid.

Mine equipment includes a 240-h. p. steam plant, with four 40-h. p. 12x14" boilers and a 2-drill Knowles air-compressor. Buildings include a 40x65' wooden machine shop, 20x30' smithy, boarding-house, bunk-house and dwellings, with a total of about 40 buildings, including an office building put up on lands not owned, and not even leased, which is a fair sample of the business methods of the company.

A 75x100' wooden concentrator has two 24" Dodge crushers, 3 centrifugal crushers and 2 tables, and is rated by company at 200 tons daily capacity, which, like all its other claims, is untrue.

The company controls, or is supposed to control, a private narrow-gauge railway, known as the Hackberry & Iron Queen railroad, of circa 5 miles length, touching the Hackberry, Boggs and Queen mines and connecting with Santa Fé line at Arizona City. Equipment includes 2 locomotives and 9 cars, unless the rolling stock *has been stolen recently* by some of the officers. *A 8-mile pipe-line, of 4" diameter, costing* $32,118.21, was suposed to

bring water from Crystal Springs, under a head of 1,150', but is out o
mission.

The company has three smelters, two worthless and one unnecessary
old Boggs or Commercial smelter, on the narrow-gauge line, having a c
and two 40-ton water-jacket blast-furnaces, hopelessly antiquated in
and equipment, was inherited from former owners. A hydrocarbon sm
designed to burn petroleum and turn out blister copper from ore by a
fusion, was built at Arizona City, on the advice of "Prof." Geo. A. T
well, a doddering old "scientist" who was used as a stalking-horse b
company, and proved a ridiculous failure, though the company sold conside
stock on the strength of its alleged "revolution" of existing processes.
hydrocarbon "smelter" is fully described in Vol. IV.

The third smelter, at Mayer, seems properly planned and constructed
apparently is a failure also, as the company's last ore shipments were
to the Humboldt smelter. This smelter is fully described in Vol. VI.
company claims a capacity, between the concentrator and smelter, of 5
600 tons of ore daily, which, of course, is an exaggeration. The comp
various smelters cost $158,893.12, according to the company's books, bu
accounts were kept so crookedly and by such unmitigated scoundrels th
is impossible to say what is to be believed.

The George A. Treadwell Mining Co. is a deliberate and intentional f
conceived in iniquity and born in sin, promoted by the late "Gen." W
S. Logan, a notorious shyster lawyer of New York, who is said to have
an estate of $500,000, accumulated by all sorts of rascalities. Every
connected with the company in an executive capacity in its palmy da
swindling was either a fool or a rascal. The management has not hesi
at any lie that seemed convenient or likely to prove profitable, and its
cial statements were deliberately false, while the advertisements, put out
the name of Myra Martin, were colossal lies. A complete exposition of th
tenness of the company would require several pages, which can be devot
better use, and the property is dismissed with the statement that the com
is a swindle of the first magnitude, without a single redeeming feature.
and should be wound up, after the principals are imprisoned.

GEORGE THIRD MINING, MILLING & SMELTING CO. COLOR

Dead. Formerly at Carson, Hinsdale Co., Colo.

GEORGETOWN GOLD MINING CO. COLOR

Mine office: Georgetown, Clear Creek Co., Colo. Frank B. Bra
superintendent. Ores carry gold, silver, lead and copper. Presumably i

GEORGIA & TENNESSEE COPPER CO. GEORGIA & FLOR

Office: care of H. G. Brooks, 35 Congress St., Boston, Mass. Lett
turned unclaimed from former mine office, Temple, Haralson Co., Ga.
Sutro, president; Otis Kimball, vice-president; Wm. Tudor, treasurer; prec
officers, L. V. Briggs and John T. Coolidge, Jr., directors; H. M. Mansfiel
perintendent. Organized Jan. 24, 1905, as successor of Tallapoosa C
Mines and Georgia Pyrites Co., with capitalization $1,000,000, shares $5
Lands, 447 acres of copper lands, in Georgia, and 800 acres of phosphate l
in Marion and Levy counties, Florida, latter estimated to carry 800,000
of phosphate. Copper lands show country rocks of Laurentian schists,
2 contact veins of 4' to 19' width, between slate and sandstone, opened
300' shaft. Has 1,250' of workings, estimated to show 85,000 tons of ore,
45,000 tons blocked out for stoping, giving average assays of 3% coppe
oz. silver and $2 gold per ton. Ore is chalcopyrite, disseminated in p
averaging 41% sulphur. Company planned installing an acid plant and m
facturing superphosphate for fertilizer. Idle.

COMPAGNIE DES MINES DE CUIVRE ET DE PLOMB DE GERONA. SPAIN.

Dead. Dissolved 1906. Formerly at Susqueda, Gerona, Spain.

GERONA COPPER CO., LTD. SPAIN.

Dead. Voluntarily wound up, February, 1903. Formerly at Hostalrich, Gerona, Spain.

GERONA COPPER & LEAD MINES, LTD. SPAIN.

Dead. Dissolved, Feb. 20, 1906. Formerly at Susqueda, Gerona, Spain. Described Vol. VI.

GERONIMO COPPER MINING CO. NEW MEXICO.

Dead. Former officers were W. A. Sanders, president; Geo. R. Funke, vice-president; W. F. McQuarrie, secretary. Was organized March 22, 1906, under laws of Arizona, with capitalization $1,500,000, shares $1 par. Lands were 5 claims, area 100 acres, 8 miles northwest of Silver City. Was a swindle, put out by the notorious Financial Security & Trust Co., of Denver, which promoted the Spanish Lost Bullion and several other downright swindles. Formerly at Silver City, Grant Co., N. M.

GERTRUDE MINE. ONTARIO.

Owned by Lake Superior Power Co.

GERTRUDE MINING CO. WYOMING.

Dead. Succeeded by Eagle Copper Co. Formerly at Battle, Carbon Co., Wyo.

MINA GERTRUDIS. PERÚ.

Mine office: San Tadeo, Yauli, Junín, Perú. Mine, opened 1897, having lenses in limestone carrying chalcopyrite and tetrahedrite, is opened by adit from the level of Lake Morococha, mining through winzes sunk from short crosscuts in the hanging, ore being hand-cobbed at the adit entrance. Ore produced, to and including 1903, averaged 15.64% copper and 1,206 grams silver per ton, total production to end of 1903 being 2,189,400 kilograms fine copper and 1,689 kilograms fine silver. Production, 1906, estimated at 750,000 lbs. fine copper.

GEYMAN MINING CO. MONTANA.

Mine office: Butte, Silver Bow Co., Mont. Lands are a small tract northeast of the Parrot smelter, having a shallow shaft. In 1906 Butte & Boston Consolidated Mining Co. secured a verdict giving damages of $72,541 for trespass and value of ore extracted. Idle some years.

GIANT CALIFORNIA MINING CO., LTD. BRITISH COLUMBIA.

Mine office: Rossland, Trail district, B. C. Jay P. Graves, president; A. L. White, vice-president; Chas. H. Wolf, secretary; Geo. Wooster, treasurer; Wm. Yolen Williams, general manager. Organized circa 1907, with capitalization $5,000,000, shares $100 par. Lands, apparently one claim, a short distance west of Le Roi. The Giant mine shipped 4,344 tons of ore, before suspending, 1903. Property considered promising and management good.

GIANT CHIEF MINING CO. UTAH.

Dead. Lands sold, circa April, 1906, to Willard F. Snyder, et al. Formerly at Bingham Canyon, Salt Lake Co., Utah.

GIANT LEDGE GOLD & COPPER CO. CALIFORNIA.

Office: 500 Frost Bldg., Los Angeles, Cal. Mine office: Manvel, San Bernardino Co., Cal. L. M. Gregory, president and general manager; H. G. Stoddard, secretary; R. W. Kenny, treasurer; Edward Brough, mine superintendent. Organized July, 1901, under laws of Arizona, with capitalization $1,000,000, shares $1 par.

Lands, 20 claims, a 40-acre millsite and miscellaneous lands, giving total area of upwards of 800 acres, *in the New York district*, showing 4 veins, of which 2 *are under development, one being a fissure* in granite, the other a

contact deposit between limestone and granite, with average width of giving average assays of 5% copper, 5% lead, 10 oz. silver and circa gold per ton, from carbonate and oxide ores near surface and sulphi depth. Has 1 shallow shaft and 2 tunnels, with about 4,000′ of underg workings, developing a considerable amount of ore. Presumably idle.

GIANT MINING CO., LTD. **BRITISH COLU**

Dead. Succeeded, circa 1906, by Giant-California Mining Co., Ltd. merly at Rossland, Trail district, B. C.

GIBB COPPER MINES, LTD. **AUSTR**

Mine office: Boolboonda, Queensland, Australia. Lands, circa 10 northeast of Mt. Perry, show 2 parallel veins, of about 12″ average carrying high grade auriferous and argentiferous copper ore. Propert a small concentrator and was producing, in a small way, early 1908.

COMPAÑIA MINERA LA GIBOSA y ANEXAS. **ME**

Dead. Lands sold to American Smelters Securities Co. Former Jiménez, Chihuahua, Mex.

GIBRALTAR COPPER MINING CO. **WYOM**

Office and mine: Encampment, Carbon Co., Wyo. Wm. L. Sill, presi Chas. E. Winter, secretary. Has a 4′ vein, opened by a 75′ shaft, showi giving assays up to 20% copper, with good gold and silver values. Has power. Idle several years and apparently moribund.

GIBSON COPPER CO. **ARIZ**

Office and mine: Globe, Gila Co., Ariz. S. L. Gibson, president, tre and general manager; Wm. Henderson, vice-president; Delos Copeland, tary. Organized 1906, under laws of Arizona, with capitalization $2,50 shares $25 par; issued, $2,000,000.

Lands, 19 claims, 5 surveyed for patents, area 380 acres, circa 15 from Globe, showing Pinal schist, with occasional trachyte, diorite and q ite, carrying 20 or more veins or lenses, occurring as fissures in schist as contact deposits between schists and porphyritic rocks. The main vein, to 7′ width, has been traced 2 miles. Ores are exclusively sulphide, m massive bornite and chalcopyrite, of extremely high grade, frequently ra 20 to 40% in copper tenor, ore occurring massive and frequently being c with chalcocite. Apparently the two main veins unite, or cross, at depth.

The mine has tunnels of 120′, 578′, 650′, 680′ and 730′, and 3 shaft cluding a 3-compartment vertical shaft, begun 1907, and the main incline s sinking below the sixth level. The fifth level tunnel, 1,000′ long, is to co with the present workings at length of 1,100′, and the sixth level tunn 900′ long.

Equipment includes two 280-h. p. boilers, a 60-h. p. engine, air-compr and 2 hoists, one with double drum, good for 1,000′ depth.

The Gibson mine was opened by its former owners, who remain in co of the company, on a capital of $90 cash and a team of horses, and has its way, and earned good profits, from grass roots, which is what very copper mines have done. Ore is shipped to the Old Dominion smelte 10-horse teams, and about 60 men are employed. Production, 1907, 3,340,777 lbs. fine copper. Mine considered valuable.

GILA COPPER CO. **ARIZ**

Office: 1107-408 South Spring St., Los Angeles, Cal. Mine office: Pinal Co., Ariz. Philip Wiseman, superintendent. Organized 1907, under of Maine, with capitalization $10,000,000. Is a twin of the Ray Consoli Copper Co., and is controlled by men prominent in the Utah Copper Co. *erty has monzonite* ore bodies, somewhat similar to those of the Utah C *Co. Property* considered promising and management good.

COUNTY MINING CO. **ARIZONA.**
ad. Once owned the Emeline mine. Formerly at Globe, Gila Co., Ariz.

MONSTER COPPER CO. **ARIZONA.**
ne office: Kelvin, Pinal Co., Ariz. Lands, known as the Confidence with circa 1,000′ of underground openings, show auriferous and argentif- ornite, chalcocite and sundry oxidized ores. Property considered prom- Idle for several years and apparently moribund.

VALLEY COPPER CO. **ARIZONA.**
fice: 1930-42 Broadway, New York, N. Y. Mine office: Safford, Gra- o., Ariz. Floyd H. Wilson, president; John F. Webber, manager; C. S. , mill superintendent. Organized 1905, as successor of Federal Mining hich succeeded the old Gila Valley Copper Co., and name changed back iginal title, and former officers put in the penitentiary, to remove the h of the Qualey management.

Lands, 24 claims, area 470 acres, also a 5-acre millsite, including the San and Great Eastern groups, in the Lone Star district of the Gila Moun- s, claimed by old management to have 3 ore bodies of about 9′ average h, but present management disclaims this statement. Development is by els of 90′, 100′ and 300′, and by shafts of 130′, 325′ and 425′, with oxidized of about 300′ depth. Mine is said to show a 28′ ore body at depth of 230′. A 50-ton concentrator, built 1906, shipped, 1907, some concentrates to the Dominion smelter, one carload returning 29.95% copper, circa 2 oz. silver 80 cents gold per ton. Production, 1907, was 110,858 lbs. fine copper, 223 silver and 6 oz. gold.

RILAMBONE COPPER MINING CO., LTD. **AUSTRALIA.**
Dead. Succeeded by Girilambone Mining Co., N. L. Formerly at Girilam- e, Canbelego Co., N. S. W., Australia.

RILAMBONE COPPER MINING CO., LTD. **AUSTRALIA.**
Office: Sydney, Australia. Mine office: Girilambone, Canbelego Co., N. W., Australia. G. A. Richards, manager; W. Blakemore, mine manager. ventures, £12,400.

Mine, opened 1880, carries numerous quartz veins and intrusions, ore oc- urring mainly as disseminations and replacements, lacking clearly defined alls, in arenaceous slate and sandstone having occasional hard bands of artzite, ore being mainly sulphide, with quartz gangue, though the mine arries considerable carbonate ore of high grade in the oxidized zone, of about depth. Deepest shaft is 520′. Ores are divided into 3 classes for treat- ment, the first comprising carbonates and cuprite of about 4.6% average cop- per, second class ore being composed of oxides from the transition zone, while sul- phides from the lower workings constitute the third class, each being smelted separately. Average of all grades, 1900, was 3.85% copper.

The smelter has 2 reverberatory furnaces and a refining furnace, turning out blister copper of the remarkable purity of 99.95%. Ores are difficult of reduction, owing to their deficiency in sulphur and iron, and excess of silica. Water is very scarce, the property having a dam and filtering and reservoir for water repeatedly. The reduction plant includes lixiviation works, where tailings and certain low grade oxidized ores are leached.

The property was reopened, 1906, when 6,035 long tons of ore were smelted, yielding 293,440 lbs. fine copper. Employed about 60 men. Mine presumably is idle.

GIRILAMBONE MINING CO., N. L.
Dead. Was succeeded, circa 1907, by Girilambone Copper Mining Co., Formerly at Girilambone, Canbelego Co., N. S. W., Australia.

GIROUX CONSOLIDATED MINES CO. NEVADA AND M

Office: 1606-42 Broadway, New York, N. Y. Mine offices: Ki White Pine Co., Nev., and Carbó, Ures, Sonora, Mex. Jos. L. Giroux dent; Eugene L. Giroux, vice-president; G. E. Giroux, secretary; J. C nedy, treasurer; Jas. Angus Snedaker, consulting engineer; Loren M. counsel; preceding officers, Isidore Hernsheim, Hoffman Richardson, C. Carty, I. W. Bernheim, G. F. Piper and Ralph Lupton, directors; E. W. general manager; Gideon L. Giroux, superintendent Mexican mine; Loui ser, superintendent Nevada mine.

Organized April, 1903, under laws of Delaware, with capitali $5,000,000, shares $5 par, increased, Feb. 25, 1908, to $6,500,000, shares $ issued, $4,639,875. Authorized, March 1, 1908, a 10-year bond iss $1,500,000, in denominations of $100, $500 and $1,000, at 6%, redeema option of company in 5 years, at 105, and convertible into common sto par, March 1, 1910, or at any previous date in the event of sale of pro or dissolution of company. Increase in capitalization was provided for version of bonds. On Jan. 1, 1908, had cash in bank, $32,768.64, with bills able of $320,233.13. Empire Trust Co., New York, registrar.

The Mexican property, of 96 pertenencias, area 237 acres, include Sultana and San José mines, commonly known as the Sultana group, ab mile west of the Copete, in the Sierra de Oro Mountains, circa 25 miles e Carbó and about 35 miles from Hermosillo. Property shows a contact ve 50′ to 100′ width, between limestone and porphyry, opened by 3 shafts. tana No. 1 is circa 200′ deep, Sultana No. 2, the main working shaft, su an incline, is 1,200′ deep, and the San José shaft is circa 500′ deep. Th José mine shows in the bottom level a vein of circa 40′ width, carrying ox ores for shallow depth, succeeded by sulphides. About 15% of the ore h from the San José is of smelting grade, balance, of 6% estimated copper being stocked. The Mexican property as a whole shows ore of 3 to 4% c tenor, with variable gold values, latter ranging from very small to very with a fair proportion of high grade ore. Shipments of Sultana ore to El smelter have returned combined gold and silver values ranging from 92 to $734.36 per ton.

The Sultana mill, apparently of 100 tons daily capacity, planned a first unit of a 200-ton concentrator, has Huntington mills, an amalgam plant and a cyanide plant.

The Nevada property, which is much the more important, is 52 claims ented, area 1,050 acres, also 1,800 acres of miscellaneous lands carrying uable water-rights, and the townsite of Kimberly, shortly west of Copper 7 to 9 miles from Ely. This group is about 2 miles in length, and from to 5,000′ in width, lying immediately west of the Nevada Consolidated.

The ore bodies of the Giroux are of vast extent and of considerable ety. The first series of ore measures, on the contact between plutoni sedimentary rocks, shows enormous areas of replacement in the latte having a gangue of quartz, talc and clay. In places these series have proven to a width of fully 1,000′, though not workable throughout, fa to the width of 100′ or more having been found at points.

The second series of ore measures is in the Giroux shaft, immed above the water level, where there apparently is a bed of 30′ to 40′ thic carrying oxidized ores said to average 7% or upwards, which probably serious overestimate.

A third ore series consists of cupriferous monzonite, which is a h altered acid quartzose andesite, carrying upwards of 60% silica. The ex surface has been leached to a considerable extent, but below a depth of 40′ the monzonite carries melaconite and chalcocite, and, at depth, chalcop

al values being in chalcocite. The porphyry ores are estimated by the
y to average 4% copper, which is much too high. The monzonite ore
f the Giroux was estimated at 1,500′ by 2,400′ in area, with prospects
her extension of the limits of mineralization, in addition to which an-
ody of cupriferous porphyry, estimated by President Giroux as 600′
d 1,400′ long, extends along Old Glory Hill, from the western end of
perty, in a course between the Alpha and Giroux shafts. This has been
only by shallow workings, but may prove profitable at depth.
monzonite ore body shows fissure veins of 3′ to 20′ width, giving
idence of faulting, and supposed to have been mineralized from solu-
rsing along the lines of least resistance. Present developments are
n fissure veins, but the quantity of porphyritic ore is so vast that ap
it forms the chief asset of the company. The porphyritic ore is com
y friable and readily amenable to concentration.
Ely mines have 11 shafts, with upwards of 3 miles of workings, in-
main working shafts having heavy gallows-frames and ore-bins. The
one at surface is followed by a zone of secondary enrichment to a
circa 375′, succeeded by unaltered sulphides. The secondary zone
siderable native copper, in addition to the usual oxidized ores and
sulphides. Porphyry ores have been developed in the Alpha, Brooks,
d Bunker Hill shafts, and Mr. Walter states that the block of milling
l therein is 2,000′ long, 150′ wide and 160′ thick, containing approxi-
000,000 tons of ore averaging circa 2.25% copper and 20 cents gold
while. the Giroux, Taylor and Alpha shafts are estimated to show
,000 tons of ore averaging 6.5% copper. The mine, as a whole, is
ve $30,000,000 worth of ore blocked out, which statement requires
n. The amount of ore actually blocked out is not phenomenally
geological conditions are such that it seems reasonably safe to
0,000 tons of ore in sight, with prospects of a much larger amount.
o doubt about the immense resources of the property in porphyritic
rincipal question being the average percentage of copper contained
w grade ores.
compartment 1,200′ Alpha shaft, to which operations are confined
, is said to have cut 5 veins, and is claimed to have a 50′ ore body
00′ level, but apparently the ores above the 1,000′ level are mainly
A winze from the bottom shows high grade ore, with some native
d the company claims that, by means of diamond drill borings, the
have been found to be continuous below the 1,000′ level, averaging
copper on that level, and increasing in value with depth, which is
onsidered a first-class exaggeration, though, without question, the
ft has ore bodies of considerable size and of high average tenor. A
hipped, 1907, to the Garfield smelter, returned 12.2 to 13.66% copper.
elieved, however, that there is a 50′ vein of this sort of ore, and
he management has been guilty, in the past, of gross exaggeration
the size of its ore bodies, and their values.
cember, 1907, the Alpha shaft caved badly, for reasons not made
but presumably through indifferent timbering. Several miners
the cave, three of whom, A. D. Bailey, Fred McDonald and
re entombed. The story of their rescue is one of the most
ory of mining, so filled with horrible accidents and
e imprisoned miners succeeded in signaling to surface,
e, and the signals were answered. A letter, well
half inch rope, from a windlass, through the
miners, because of a bend in the pipe column
being imprisoned in a small pump station.

emergency, however, and by means of a hook, made from a piece of wire a bit of pipe, fished the letter from the pipe-column. Acting under instruc the miners succeeded in repairing the telephone, after which communic from surface was uninterrupted. Food and water were lowered throug pipe, in trains of 2" nipples, each 6" long, with caps, connected by fl links, and even reading matter was supplied in the same manner. The miners were rescued Jan. 19, 1908, after an imprisonment of 46 days.

The work of reopening and retimbering the Alpha shaft was comp May, 1908, requiring nearly 6 months. Equipment at the Alpha includ electric pumping plant, of 250,000 gallons claimed daily capacity. The su plant includes three 150-h. p. boilers and a first-motion double-drum hoist steel gallows-frame, and a 200-h. p. Corliss engine driving a 150-kw. gen that actuates the electric pumps.

The 2-compartment Giroux shaft, 800′ deep, is said to show, on the level, a large ore body of 7 to 15% average copper tenor, which is consi a serious overestimate.

The Morris shaft, with 2 compartments and circa 275′ in depth, is id

The 2-compartment Brooks shaft, 1,200′ from the Morris, and 455′ also is idle.

The 2-compartment Bunker Hill shaft, east of the Brooks, circa 5 depth, has a hoist operating 3-ton self-dumping skips.

The 2-compartment Taylor shaft, circa 300′ deep, is idle. The 2-com ment Pilot Knob shaft, of about 300′ depth, also is idle.

Surface equipment at the mine includes hoists for the principal shaft compressors, timber framing mill, and necessary shops.

Transportation is provided by a 2-mile 36" gauge railway connectin Bunker Hill, Morris and Brooks shafts with the mill and smelter, grad eraging 1.5%. Equipment includes a Porter engine, of 660 tons tractive p and ore-cars.

The mill, located at the mine, of wood, stone and concrete, with al chinery mounted on concrete foundations, of about 400 tons daily cap was completed September, 1907, at a cost of circa $160,000. The mill is pl to handle ore automatically throughout, and has 600-ton receiving bins, which ore goes to a 10x24" crusher, with belt-conveyor and 40" tro Equipment includes 6 Frue vanners and 42 Wilfley tables. Power is furn by 125-h. p. and 200-h. p. Corliss engines, with three 100-h. p. boilers, an mill is heated by steam and lighted by electricity.

The mill has eight 8,000-gallon storage tanks for water, and 90,000-gallon reservoirs, of cement and concrete, one at the Alpha shaft one directly back of the mill, connected by 2,050′ of 6" steel pipe. It is mated that settling tanks will save about 80% of the wash-water for fu use. The mill requires about 125,000 gallons of water daily, and the ma ment plans securing water therefor from the Alpha shaft, which would a precarious supply, though the flow of the shaft is increasing with depth, was claimed, September, 1908, to be circa 125,000 gallons daily. The s however, did not furnish enough water to run the mill when the latter completed, despite promises to that effect, and an alternative and appar reliable supply is being developed.

Work was begun, circa July, 1908, by digging ditches, for a pipe-line Steptoe Creek, of about 9 miles length. Water must be pumped through pipe-line, of 1,125,000 gallons nominal daily capacity, against an actual of 967′, with static and frictional head of 1,105′. Cost of the pipe-line station-pump is estimated at circa $250,000. Apparently the mill should been built near the water, instead of near the ore.

The company also has rights to a portion of the waters of

GLASDIR COPPER MINES, LTD.

Dead. Voluntarily liquidated, October, 1903.

GLÁSDIR COPPER MINES (1903), LTD.

Offices: 4 Broad Street Place, London, E. C., Eng. Organized 1903, with capitalization £1,000, shares £1 par, apparently as a tentati ganization of the Gladsir Copper Mines, Ltd. Moribund.

GLASGOW COPPER SYNDICATE, LTD. CALIF

Offices: 149 St. Vincent St., Glasgow, Scotland. T. & G. B. M Cook, secretaries. Organized Dec. 14, 1904, with capitalization £8,000 £1 par, to deal with copper claims in Fresno county, California. Pre related to Fresno Copper Co., Ltd.

GLASGOW & WESTERN EXPLORATION CO., LTD. NI

Offices: 33 Renfield St., Glasgow, Scotland, and 317 McCornick Bl Lake City, Utah. Mine office: Golconda, Humboldt Co., Nev. Geo. lane Reid, chairman; Otto Stallman, general manager; D. Macpherso secretary; Jos. Farren, superintendent; George Cuthbert, secretary. O Oct. 28, 1896, with capitalization £30,000, shares £1 par, fully issued ages and is the principal owner of the Adelaide Star Mines, Ltd.

GLASSFORD CREEK COPPER MINING CO., LTD. AUST

Office: William St., Rockhampton, Queensland, Australia. M works office: Glassford Creek, via Miriam Vale, Queensland, Australia Brown, chairman; A. A. Slack, secretary; Thos. Gibb, managing dire L. Bailey, general manager; D. W. Findlay, mine superintendent; p officers, G. C. Willcocks, Jas. Stewart and Robt. Macfarlane, directo creased capitalization, 1906, to £10,000, shares 1s. par, fully paid, with vision for meeting future needs by assessments. Debentures, £12,500 and an issue of similar size planned, at last accounts.

Lands are in the Dawes Range, 60 miles south of Gladstone, adjoi Glassford Creek Copper Mines, Ltd., having a slate footwall and granit ing, with contact veins of 30′ to 75′ width carrying self-fluxing ore giving average returns of 4.1% copper, 1.5 oz. silver and 1.95 dwts. long ton. Mine, discovered 1897, was opened, in the Blue Bag open underhand stoping, but this was discontinued at depth, and developmen by tunnel and shaft, the change of mining system necessitating clos smelter.

The mill has a 300-ton Blake-Marsden crusher, and picking table smelter, near the mine, has a 42x72″ rectangular water-jacket blast-fu about 100 tons daily capacity, installed 1906, and a Connersville blow ing matte of 40 to 45% copper tenor, slags running 0.3% copper. Near road point is Gladstone, 35 miles. Traction engines were used, but did on account of bad roads. Production, 1906, was 913,366 lbs. fine copper oz. silver and 94,314 dwts. gold, secured with an average force of 1 Suspended operation Sept. 7, 1907, on account of low price of copper.

GLEN-JENNINGS COPPER MINING CO. WY

Mine office: Encampment, Carbon Co., Wyo. Idle some years.

GLOBE-AMALGAMATED COPPER CO. AR

Dead. Was organized June 19, 1907, under laws of Arizona, by Pearson, J. R. Barnette and G. C. Gleason, with capitalization $1,000,00 $5 par. Formerly at Globe, Gila Co., Ariz.

GLOBE-ARIZONA COPPER CO. AR

Mine office: Globe, Gila Co., Ariz. Samuel L. Gibson, manager. lying southeast of the Old Dominion and Globe Consolidated, 3 miles Globe, are opened by a 115′ tunnel and 290′ shaft, showing a 5′ vei *averaging 6 to 7%* copper, with small silver values. Began producti *1907, and shipped* about 15 tons of ore daily to Old Dominion smelter,

eral months, employing circa 30 men. Production, 1907, was 57,231 lbs. fine copper and 430 oz. silver. Property considered promising.

GLOBE & ARIZONA DEVELOPMENT CO. **ARIZONA.**

Dead. Lands sold, 1906, to Superior & Boston. Formerly at Globe, Gila Co., Ariz. Described Vol. VI.

GLOBE-BOSTON COPPER MINING CO. **ARIZONA.**

Dead. Lands sold, circa 1906, to Globe Consolidated Copper Co. Formerly at Globe, Gila Co., Ariz.

GLOBE CONSOLIDATED COPPER CO. **ARIZONA.**

Office: 403 Lonsdale Bldg., Duluth, Minn. Mine office: Globe, Gila Co., Ariz. Henry B. Hovland, president; R. B. Whitesides, vice-president; John Uno Sebenius, secretary; preceding officers, Louis Rouchleau and Hoval A. Smith, directors; T. T. Hudson, treasurer; Michael M. McCarthy, manager. Organized June, 1906, under laws of Arizona, with capitalization $1,500,000, shares $10 par; issued, $1,000,000. Cash on hand, Jan. 1, 1908, was $173,085. There is supposed to be a balance of $367,966 due on lands, February, 1910.

Lands, circa 1,100 acres, bought for about $600,000, lying immediately north of the Old Dominion and west of the Arizona Commercial. Property includes the Globe-Boston group of 21 claims, bought for $130,000, the Mallory group, and other extensive holdings.

Principal work has been done on the Gem and Future veins, carrying a little chalcopyrite. The Globe-Boston or Mallory shaft, when worked on the 400' level by former owners, showed a 4' vein carrying mainly leached ore, with some low grade chalcopyrite and occasional bunches of bornite, both with fair silver values, but shows better ore in the deeper workings.

The 3-compartment Gem shaft, 1,225' deep, has extensive crosscuts on the 1,100' and 1,200' levels. No. 3 crosscut, on the 1,100' level, in August, 1908, cut the Future vein, showing 16' of ore of 2 to 3% copper tenor. There also is a 3' vein of 3% ore on the west drift of the 1,200' level, and a 6" vein of 8% ore. In addition to the veins previously named, the property carries the Taylor vein.

Equipment includes good hoists and air-compressors at both the Boston and Gem shafts, latter having a 12-drill compressor. Petroleum is used for fuel, and about 75 men are employed.

Results for the first two years of work were rather discouraging, but in- erations were much improved late in 1908. Property is considered promising, and management good.

LOBE COPPER CO. **NEVADA.**

Letter returned unclaimed from former mine office, Ely, White Pine Co., ev. Lands, 6 claims, bought March, 1907.

OBE COPPER MINING CO. **ARIZONA.**

Dead. Property sold to Old Dominion Mining & Smelting Co. Formerly Globe, Gila Co., Ariz.

OBE COPPER MINING CO. **WYOMING.**

Office: 24 Giddings Blk., Colorado Springs, Colo. Mine office: Hecla, amie Co., Wyo. A. C. Widdicombe, president; J. A. Morrison, vice-president general manager; John H. House, secretary; Stewart Davis, treasurer; f. H. C. Beeler, consulting engineer. Organized 1901, under laws of Colo- o, with capitalization $1,500,000, shares $1 par. Lands, 22 claims, area 438 s, known as the Fairview group, in the Silver Crown district, showing dry fissure veins, of which 3, of 7' average width, are opened by 5 shafts, 00' average depth, and by tunnels of 90' and 160', giving estimated average es of 12% copper, 6 to 10 oz. silver and $5 gold per ton, from sulphide . Has steam power and an *air-compressor*. *Did* a little work, 1906. Pro- ably *idle*.

GLOBE & LOST GULCH SILVER-COPPER MINES CO. ARIZ

Office: 21-1928 Grant Ave., Denver, Colo. Mine office: Black W Gila Co., Ariz. V. G. Hills, president; John A. Myrberg, vice-presiden superintendent; M. E. Brooke, secretary and treasurer. Organized Apr. 1, under laws of Arizona, with capitalization $1,000,000, shares $1 par. L 10 claims, area 200 acres, and a millsite, at the head of Lost Gulch, nort of Globe, showing quartzite, granite and limestone, cut by porphyritic d Mine, but slightly developed, shows auriferous and argentiferous lead copper ores.

GLOBE MINE. MICHI

Office: 82 Devonshire St., Boston, Mass. Mine office: Painesdale, H ton Co., Mich. F. W. Denton, general manager; Capt. John Jolly, su tendent. Property is owned by the estate of John Stanton, and held und option, twice extended, expiring May, 1909, by the Copper Range Consoli Co., latter having the privilege of paying therefor in shares. During expenditures on the property were $191,580.92, with total expenditures, to 1, 1908, of circa $400,000.

Lands, 1,280 acres, being Sections 1 and 2, Town 53 North, Range 35 lying next south of the Champion and immediately north of the Chal mine, carrying about 6,000′ of the strike of the Baltic and parallel am loidal beds.

Work was begun by diamond drill borings, which located the Baltic and gave some cores carrying excellent copper values. The borings disc the existence of a heavy overburden of sand and boulders, hence it was n sary to reach the solid rock by a vertical shaft, which was sunk in the ha wall. This shaft is located about 700′ south of the Champion boundary and was put down under most discouraging circumstances, but by persis and the hardest kind of hard work was bottomed successfully, despite p tions, from many experienced miners, that its sinking was impossible. shaft is telescopic, inside measurements of timbers at the collar 13′ 3″ x 23′ 3″, with a second section below of 9′ x 19′ 6″, and a third se of still smaller size, this plan permitting new inside timbering and wha realignment was necessary when the shaft was bottomed. The drop-shaft started October, 1905, and reached the ledge May 15, 1907, at a depth of after 19 months of extremely difficult and trying work, 3 months addit being required in getting the shaft into the ledge and stopping out the making a total of nearly two years for the work, which was most creditab all concerned, this being the deepest sand-shaft ever sunk. The shaft sunk by weight to 150′ depth, and for the balance of the distance was f down by hydraulic jacks, with the aid of 64 steel shoes, each built w water-jet having an opening of 1 square inch and a pressure of 300 lbs. W of the shoes was 37,000 lbs., and these were punched down by 6 hyd jacks, each exerting a pressure of 100 tons. The shaft was wet, makin gallons of water per minute, and there was much trouble with the quick while the terrific pressure of the hydraulic jacks caused occasional trouble buckling.

Plats have been cut at intervals of 100′ from the first level, which is from surface, leaving a 128′ back of solid rock. The mine is to have permanent pumps on the 1,000′ level, and will use Kimberley skips for ing. The Baltic lode was intercepted at 860′ depth, but was reached previ by crosscuts from a level above. The bed shows a little copper, in drif the 1,000′ level, but, on the whole, is decidedly low in grade. This, how is no criterion of the future, as the Baltic amygdaloid, in common wit other copper-bearing beds of the Lake Superior district, is bunchy, rich g alternating with lean, and only extensive development can give a correct

of the probable average value of the lode on this property. In view of the rich drill-cores secured by borings, and the fine stopes opened in the Champion, a short distance north of the Globe, it would seem reasonable to expect the Globe to make a paying mine, with development. If this should be the case, it is probable that the mine will be opened permanently by incline shafts, driven as upraises, though, in view of the tremendous overburden, vertical shafts may be used throughout, or vertical shafts may be sunk through the bed and deflected, in the footwall, to parallel the dip of the bed.

GLOBE MINING CO. **ARIZONA.**

Office: 506-171 Washington St., Chicago, Ill. Mine office: Globe, Gila Co., Ariz. J. F. Hechtman, president and general manager; M. A. Patterson, vice-president; Geo. L. Beach, treasurer; Walter M. DeKalb, secretary. Organized Feb. 19, 1903, under laws of Arizona, with capitalization $2,500,000, shares $1 par.

Lands, 27 claims, area 540 acres, nearest circa 2½ miles north of Globe. Lands show granite-porphyry, syenite, quartzite and diorite, carrying fissure veins in diorite of 2′ to 100′ width, with gossans giving assays of 2 to 6% copper, 4 to 30 oz. silver and $2 to $28 gold per ton. The Mineral Farm group of 21 claims, 3 fractional, includes the Vacey-Constance mine, worked circa 1886 for silver, and said to have produced upwards of $100,000 worth of ore under former ownership, this group having upwards of 20 old pits and shafts, of 20′ to 165′ depth. The Mineral Farm group shows altered sedimentary and igneous rocks, with iron dykes, and a complex fissure system. The Mineral Farm vein, of about 4′ width, gives assays of 4.8% copper and up to 132 oz. silver and $7.44 gold per ton, and the group also shows a 20′ vein, said to sample 22% copper, 9% zinc, 2 oz. silver and $4.96 gold per ton, which seems excessive. Property also includes the Eagle Pass group. Development is by a 2-compartment 215′ shaft, between two iron outcrops, planned to be sunk to 500′.

Equipment includes a 60-h. p. boiler, 8x10″ hoist and an air-compressor. Property is considered promising.

GLOBE & PINTO MINING CO. **ARIZONA.**

Mine office: Globe, Gila Co., Ariz. T. Trevillian, president; J. M. McPherson, secretary and treasurer. Capitalization $750,000, shares $1 par. Lands, 11 claims, 16 miles from Globe, north of and adjoining the Five Points, having a 90′ shaft in a 4′ vein showing streaks of ore, on footwall and hanging, that have given assays up to 22% copper, 3.4 oz. silver and $8 gold per ton. Mine does not show several thousand tons of ore of 4 to 12% copper value, as has been claimed in the press.

GLOBE STANDARD MINING CO. **ARIZONA.**

Mine office: Globe, Gila Co., Ariz. Chas. Miller, superintendent. Lands, 4 claims, in Powers Gulch, having a 50′ shaft showing a 3′ vein of auriferous silver-lead ore, assaying up to 63% lead, 13 oz. silver and $6 gold per ton; also 15 claims near the Arizona National Mining Co.

GLOBE SULPHIDE COPPER CO. **ARIZONA.**

Letter returned unclaimed from former mine office, Globe, Gila Co., Ariz. Organized Nov. 26, 1906, under laws of Arizona, with capitalization $1,000,000, shares $1 par, by Eugene Barrows and D. G. McDonald.

GLOBE TRACT. **MICHIGAN.**

Office: care of John Stanton Estate, owner, 15 William St., New York, N. Y. Mine office: Atlantic Mine, Houghton Co., Mich. Lands, 1,920 acres, being Sections 3, 4 and 5, Town 53 North, Range 35 West. Property included two other sections, area 1,280 acres, now *under option* to the Copper Range Consolidated Co., *which are described separately under* title of Globe Mine.

GLOBE WESTERN COPPER CO. ARIZ

Mine office: Globe, Gila Co., Ariz. N. C. Cottee, vice-president; D. treasurer; J. Weinberger, secretary; preceding officers and C. Jerome directors. Capitalization $2,000,000, shares $10 par. Lands, 40 claims 800 acres, in 3 groups, known as the Cole & Goodwin, Robertson & West and Clark & Stewart, circa 20 miles southwest of Globe. The Clark & St group has a 250′ shaft, bottomed in sulphide ore assaying 10 to 15% coppe some shipments were made therefrom, 1906, to Old Dominion smelter. The Goodwin group has a 310′ shaft and a 480′ crosscut tunnel. The Robert Westbrook group has tunnels of 100′ and 130′ and a 225′ crosscut tunne ting 2 small streaks of high grade ore. Property, as a whole, has mainl of concentrating grade, and deposits are somewhat bunchy. Has ga power. Property considered promising.

GLOBE-WHEATFIELDS MINING CO. ARIZ

Office and mine: Globe, Gila Co., Ariz. J. Thornton Price, presiden G. Nehms, secretary; preceding officers, Fred C. Boothe and Claude W. foot, directors. Organized Oct. 25, 1906, under laws of Arizona, with italization $1,000,000, increased Jan. 2, 1907, to $1,500,000, shares $ Lands, near the Arizona National and Globe & Calumet, held under $ bond and lease, have shown ores assaying 4.32 to 24.38% copper.

GLORIA COPPER MINES (SPAIN), LTD. S

Office: 75 Coleman St., London, E. C., Eng. Organized Feb. 27, under laws of Great Britain, with capitalization £1,700, shares £ Property is a lease on La Gloria mines, in the province of Huelva, Spain

COMPAÑIA MINERA GLORIA DEL INCA. C

Office: Iquique, Chile. Mine offices: Chañaral, Atacama, Chile, a piapó, Atacama, Chile.

GEWERKSCHAFT VEREIN GLÜCKAUF-NEVIGES. GERM

Mine office: Neviges, Rheinprovinz, Germany. Has lead and coppe developed by 2 shafts, and employed about 100 men, producing circa tons of ore yearly, at last accounts, product being mainly lead.

GEWERKSCHAFT GLÜCKSBRUNN. GERM

Dead. Merged, 1903, in the Eisfelder Kupfergewerkschaft. Forme Glücksbrunn, Saxe-Meiningen, Germany.

GOAT CREEK MINING CO. WASHIN

Mine office: Methow, Okanogan Co., Wash. Ores carry gold, silv copper. Idle.

GODIVA MINING CO. U

Dead. Merged, circa 1906, in Gemini-Godiva Consolidated Mini Formerly at Eureka, Juab Co., Utah.

GOLCONDA CONSOLIDATED CO., LTD. NEV

Office: Suffolk House, London, E. C., Eng. Mine office: Golconda, boldt Co., Nev. W. P. Taylor, chairman; E. T. McCarthy, consulting eng William Smith, secretary; E. L. Labadie, superintendent; Hans Loesch, lurgist. Organized Dec. 27, 1906, under laws of Great Britain, with capi tion £250,000, shares £1 par; issued, £21,967. Lands, in the Kennedy and Mountain districts, show mainly lead ores. Early 1908 planned build 200-ton smelter, in Golconda Cañon, 3 miles from Golconda.

GOLCONDA-NEVADA COPPER CO. NEV

Mine office: Golconda, Humboldt Co., Nev. J. H. Playter, superi ent. Lands, known as the Honolulu group, are opened by a short tunnel *low shaft* and several open-cuts.

GOLD ANCHOR MINING CO. **COLORADO.**

Mine office: Alice, Clear Creek Co., Colo. Thos. I. Slater, manager. Ores carry gold, silver and copper. Has gasoline power. Presumably idle.

GOLD BELT DEVELOPMENT & REDUCTION CO. **ARIZONA.**

Office and mine: Morenci, Graham Co., Ariz. E. U. Beauchamp, manager; Lee Dunn, superintendent. Capitalization, $750,000. Lands, 25 claims, circa 4 miles northwest of Morenci, showing free milling gold ore, mainly in quartzite, and copper ore, largely chrysocolla associated with pyrolusite, with occasional malachite and chalcocite, and some sphalerite. Has 8 shafts, 2 deepest 200' each, and a tunnel, showing a 3' vein of carbonate ore assaying 12% copper. Has 3 gasoline hoists. Shipped some ore, 1907, to Shannon smelter, and has circa 15,000 tons of ore on dumps. Employed 20 men at last accounts.

GOLD BELT MINING CO. **MONTANA.**

Mine office: Empire, Lewis & Clark Co., Mont. Owen Byrnes, superintendent. Property includes the Empire mine, carrying gold, silver, lead and copper ores. Has steam power, 60-stamp mill and cyanide plant. Presumably idle.

GOLD BUG CONSOLIDATED MINING CO. **WASHINGTON.**

Dead. Formerly at Bossburg, Stevens Co., Wash.

GOLD & COPPER COMPANY OF BINGHAM. **UTAH.**

Dead. Succeeded, 1901, by Bingham Consolidated Mining & Smelting Co. Formerly at Bingham Canyon, Salt Lake Co., Utah.

GOLD & COPPER CONSOLIDATED MINING & MILLING CO. **ARIZONA.**

Dead. Succeeded, circa 1907, by Hasayampa Copper Co. Formerly at Groom Creek, Yavapai Co., Ariz. Fully described Vol. VI.

GOLD & COPPER DEEP TUNNEL MINING & MILLING CO. **NEW MEXICO.**

Office: 780 E. Madison Ave., Cleveland, Ohio. Mine office: Elizabethtown, Colfax Co., N. M. A. T. McIntyre, president; John Pearson, vice-president; A. Dorn, secretary and treasurer; W. P. McIntyre, mine superintendent. Organized October, 1900, under laws of New Mexico, with capitalization $500,000, shares $1 par.

Lands, 10 claims, area circa 100 acres, also a 2½-acre millsite, on the western slope of Baldy Mountain, in the Moreno district, carrying fissure and contact veins in and between quartzite and slate. Has 2 shallow shafts and a [illegible] crosscut tunnel, planned to penetrate the mountain, with a length of [illegible], opening 2 bodies of low-grade auriferous copper ore. Has gasoline power and electric drills, with a 20-ton stamp-mill of lumber and logs, size [illegible], equipped with a 5' Huntington mill and gravity stamps. Nearest railroad, 3 miles. Company plans continuing development steadily. Property considered promising.

GOLD & COPPER FIELDS SYNDICATE, LTD. **AUSTRALIA.**

Dead. Voluntarily liquidated, March, 1902. Formerly at Byng, County Thurst, N. S. W., Australia.

GOLD-COPPER MINING CO. **ARIZONA.**

Office and mine: Prescott, Yavapai Co., Ariz. Chas. F. Motz, president; Emil Rautman, secretary, treasurer and general manager. Lands in the Hasayampa district, include the Peacock, Mountain View and Iron Duke claims, opened by a 600' tunnel, cutting a vein carrying auriferous and argentiferous copper ore, yielding assay values up to $30 per ton.

GOLD-COPPER MINING CO. **CALIFORNIA.**

Letter returned unclaimed from former office, Rocklin, Cal. Mine offices: Rocklin, Placer Co., Cal. Capitalization $1,000,000, shares $1 par. Lands, 160 acres, supposedly carrying the extension of the Dairy Farm ore body, slightly developed by shaft. Idle.

GOLD & COPPER MINING CO. NEW

Dead. Formerly at Rociada, San Miguel Co., N. M.

GOLD-COPPER MINING & DEVELOPMENT CO. SOUTH D

Dead. Formerly at Deadwood, Lawrence Co., S. D.

GOLD CROSS MINING & MILLING CO. COL

Mine office: Pitkin, Gunnison Co., Colo. R. L. McKnight, sup ent. Property is the Camp Bird mine, showing gold and copper ores 10-stamp mill.

GOLDEN COVE MINING CO. NEW

Mine office: Hachita, Grant Co., N. M. W. H. Hare, presiden Stewart, vice-president; Fred E. Emery, secretary and treasurer. Ha pits and shafts of 10′ to 85′ depth, showing a vein claimed to give assays of 18% copper and 20% lead, with gold and silver values. Pr idle.

GOLDEN DESERT MINING & MILLING CO. A

Dead. Formerly at Quartzite, Yuma Co., Nev.

GOLDEN EAGLE GOLD MINING CO. CALI

Office: 54 First St., Portland, Ore. Mine office: Copley, Shasta R. J. Jennings, president and general manager; R. A. Martin, vice-p Jas. E. Isaacs, secretary; C. C. Bush, Jr., treasurer; preceding officers, lands and I. Theodore Jennings, directors. Organized under laws of with capitalization $1,000,000, shares $1 par.

Lands, 8 claims, area 160 acres, held under bond and lease expir known as the Keystone group, on the eastern side of the Sacrame circa 10 miles northeast of the Iron Mountain mine. Property, deve tunnel, is said to show 5 gold-bearing quartz veins, of 2′ to 20′ widt ing $5 to $20 gold per ton, and a copper vein, claimed to be 6′ to and traceable 2,200′, carrying ore of 5 to 22% copper tenor, with $7.80 gold per ton.

GOLDEN EDGE MINING CO. WY

Dead. Formerly at Rambler, Carbon Co., Wyo.

GOLDEN GATE GROUP. COL

Mine office: Tarryall, Park Co., Colo. Property, near the foot o Mountain, is said to show a vein of 10′ to 30′ width, giving assays 62% copper, and $10 and upwards gold per ton. Idle.

GOLDEN GATE MINING & DEVELOPMENT CO. WASH

Office: care of Gen. C. E. Buel, Seattle, Wash. Mine office: Kittitas Co., Wash. Lands are 3 claims in Josephine county, Oreg 1,000 acres of coal lands, and 22 claims in vicinity of Cle Elum, show galena of good grade, but mainly low grade ore assaying 1 to 4% co $4 to $7 per ton in combined gold and silver values.

GOLDEN MARGUERITE SILVER & COPPER MINING CO.

Letter returned unclaimed from former mine office, Mullan, Shos Idaho. Organized 1908, with capitalization $1,500,000. Lands, 10 c the Hunter district. Idle.

GOLDEN MINT MINES, LTD. N

Dead. Voluntarily liquidated, October, 1903. Formerly at Lyn Norway.

GOLDEN RULE COPPER MINING & SMELTING CO. A

Dead. Was a swindle. Formerly at Vail, Pima Co., Ariz. scribed Vol. VI.

GOLDEN SHOWER COPPER CO. A

Mine office: Tucson, Pima Co., Ariz. Chas. F. Hoff, president *eral manager.* Capitalization $3,000,000, shares $1 par. Lands, 4 cla

80 acres, 14 miles northwest of Tucson and 6 miles from Rillito Station on the Southern Pacific railway. Has a 20′ shaft. Idle.

GOLDEN STAR MINING CO. **IDAHO.**

Dead. Formerly at Doniphan, Blaine Co., Idaho.

GOLDEN STATES MINES, LTD. **ARIZONA.**

Office: 20 Lawrence Lane, London, E. C., Eng. Mine office: Dragoon, Cochise Co., Ariz. Chas. F. Branton, chairman; George Thompson, secretary. Organized June 25, 1897, as reconstruction of Geldfontein Estates & Gold Mining Co., Ltd., with capitalization £100,000, shares 5s. par; issued, £61,254. Lands, 120 acres, with questionable title, on Copper Creek, in the Dragoon Mountains. Has a small smelter. Idle some years.

GOLDFIELD COPPER-GOLD MINING CO. **NEVADA.**

Dead. Was organized March, 1907, under laws of Arizona, with capitalization $1,000,000, shares $1 par. Officers were W. W. Talbot, president; T. E. Davis, vice-president; E. A. Jenkins, secretary; D. L. Hopkins, treasurer. Lands were 2 claims and a millsite, circa 5 miles from Hawthorne. Formerly at Hawthorne, Esmeralda Co., Nev.

GOLDFIELD COPPEROPOLIS MINING CO. **NEVADA.**

Office: 1130-11 Broadway, New York, N. Y. Letter returned unclaimed from former mine office, P. O. Box 198, Goldfield, Esmeralda Co., Nev. J. P. Marshall, president and treasurer; R. Tidwell, vice-president; Robt. Blei, secretary; preceding officers, G. H. Phillips and G. A. Phillips, directors. Organized under laws of Arizona, with capitalization $1,000,000, shares $1 par.

Lands, 6 claims, known as the Comstock group, at Copperopolis, just north of Lone Mountain, and 3 claims at Phillipsburg, circa 20 miles northwest of Goldfield, showing an outcrop carrying argentiferous copper ore and argentiferous lead ore, opened by a 250′ tunnel.

GOLDFIELD ELY FAIRVIEW WONDER MINING CO. **NEVADA.**

Dead. Was promoted by Arthur Levan, one of the swindlers who put out the Lost Spanish Bullion Mines Co. Was a mere bit of stock-jobbery. Formerly at Ely, White Pine Co., Nev.

GOLD FLINT MINING CO. **MONTANA.**

Dead. Was succeeded, circa 1907, by Lion Gulch Development Co. Formerly at Homestake, Jefferson Co., Mont.

GOLD HILL COPPER CO. **NORTH CAROLINA.**

Office: 82 Broadway, New York, N. Y. Mine office: Gold Hill, Rowan Co., N. C. Leonard D. Baldwin, president; Wm. M. Richardson, secretary and treasurer; J. C. Kemp Van Ee, managing director; preceding officers, C. Strader Hoyt, E. N. Howell and W. E. Murdock, directors; B. B. Miller, receiver. Organized Feb. 21, 1900, under laws of New Jersey, with capitalization $5,000,000, shares $100 par.

Lands, 1,050 acres, in Rowan and Stanley counties, well watered and timbered, including the Gold Hill mine, where gold was discovered in 1799. Gold-bearing quartz veins were discovered in 1831, and circa 1845 this mine was the largest gold producer in the United States. Property is served by the Southern railroad, and the Yadkin river has 7,500-h. p. available, 17 miles distant.

Development is by shafts of 105′, 150′, 615′ and 830′, estimated to show ore reserves of 60,000 tons, carrying 2.75 to 3% copper, and 60 cents to $1.60 per ton. A carload of ore, shipped early 1908 to the Perth Amboy smelter, assayed 1.5% copper and circa $30 gold per ton, with small silver values.

Equipment includes ten 100-h. p. boilers and a 40-stamp mill. About 75 men were employed, February, 1908.

The company has had a decidedly checkered career. Operations were conducted on a *considerable scale, 1901-1903, employing* 250 men, but financial

GOULBURN COPPER DEVELOPMENT CO. AUSTRA

Mine office: Breadalbane, N. S. W., Australia. Development is on an ore body of some promise.

GOULD COPPER MINING CO. ARIZO

Mine office: Tucson, Pima Co., Ariz. S. H. Gould, president and ge manager; C. E. Hutchison, vice-president; W. H. Daily, secretary; Dr. W Whitmore, treasurer. Capitalization $1,000,000, shares $1 par. Lands claims, in the Tucson Mountains, 18 miles from Tucson, nearest railroad p Lands cover nearly 1 mile of the east and west strike of a mineral zone 2,000′ wide and 5 miles long. Country rocks are limestone, granite and quart Has shafts of 50′, 125′ and 365′, with 2 short tunnels, showing chalcop with quartz gangue, averaging about 3 to 4% copper, 3 oz. silver and gold per ton, with sufficient iron to be self-fluxing. Has about 2,000 ton ore on the dump. Equipment includes gasoline hoist and air-compre Property considered promising.

GOULD ISLAND MINE. ALAS

Mine office: Sulzer, Prince of Wales Island, Alaska. H. R. Gould, o and manager. Lands, 1 claim, area 20 acres, showing a lenticular ore b between hornblende-schist and limestone, up to 40′ in width, giving assay about 6% copper, 1 to 20% lead, 3% zinc, 1 oz. silver and $4 gold per from chalcopyrite, galena and sphalerite. Has tunnels of 60′ and 70′.

GOULD MINING CO. WYOMI

Dead. Formerly at Centennial, Albany Co., Wyo. Described Vol. VII.

GOVERNOR GREENWATER COPPER CO. CALIFOR

Mine office: Greenwater, Inyo Co., Cal. Is controlled, through ow ship of entire stock issue, by Greenwater Copper Mines & Smelters Co. sumably idle.

GRAFTER MINE. YUK

Mine office: White Horse, Yukon, Canada. Robt. Lowe, mana Shipped, 1905, circa 450 tons of ore, of 19 to 30% copper tenor, to var British Columbia smelters, and, for several months, 1907, shipped 25 to tons daily to Tyee smelter. Was reached, 1907, by White Pass & Yukon road. Employs circa 20 men. Production, 1907, estimated at 650,000 lbs. copper.

GRAFTON COPPER MINING CO. AUSTRA

Mine office: Grafton, N. S. W., Australia. Samuel Lee, chairman; W Mulligan, mine manager. Net earnings, 1907, were £14,251, and £11,000 dends were paid. Mine, known as the Cangai, has 2 veins, the south lod 3′ to 10′ width carrying up to 6′ of massive copper sulphides containing gold and silver values. Ore reserves, 1908, estimated at 112,177 long of which 17,000 tons were estimated to carry 10% copper; 23,000 ton carry 6% copper, and 70,000 tons to carry 3.5% copper. Smelter has verberatory furnaces, producing matte, and management plans changing duction to blister copper, in the form of anode bars. Trouble is had in s ing fuel, and water supply is precarious. Company plans building a contrator and installing electric power. Production, 1907, was 7,665 long of ore, of which 3,535 tons were smelted to matte, containing 790,840 lbs copper, 2,816 oz. silver and 176 oz. gold. Company apparently lacks fina strength, but property is of considerable promise.

GRAHAM COUNTY MINING CO.

Office: 1509-20 Broad St., New York, N. Y. Mine office *Co., Ariz.* John W. Manning, president; Schuyler S. *treasurer;* "Prof." Geo. A. Treadwell, consulting e *$250,000,* shares $10 par. Lands are gold-copper clai

on which the company claims to have expended upwards of $100,000 in development work. Idle for several years and apparently moribund.

GRAHAM COUNTY MINING & SMELTING CO. **ARIZONA.**

Mine office: Safford, Graham Co., Ariz. H. N. Chlarson, president. Lands, 13 claims, west of the Rex Cobre. Idle.

GRANADEÑA MINING CO. **MEXICO.**

Mine office: Santa Barbara, Hidalgo, Chihuahua, Mex. Lands, 3 miles northeast of Santa Barbara, show argentiferous and auriferous chalcopyrite, galena, sphalerite and pyrite.

GRANBY CONSOLIDATED MINING, SMELTING & POWER CO., LTD. **BRITISH COLUMBIA.**

Office: 733-52 Broadway, New York, N. Y. Mine office: Phœnix, Boundary district, B. C. Works office: Grand Forks, Boundary district, B. C. Employs about 900 men, of whom approximately 500 are at the mine, and 400 at the smelter. Jacob Langeloth, president; Jay P. Graves, vice-president and general manager; Geo. Martin Luther, second vice-president; Geo. Crawford Clark, Jr., third vice-president; preceding officers, Geo. Crawford Clark, Henry Lee Higginson, B. Hochschild, Wm. H. Nichols, W. H. Robinson, Sanford H. Steele, Edwin Thorne, A. L. White, Payne Whitney and Wm. A. Nash, directors; Northrup Fowler, secretary; G. W. Wooster, treasurer; A. B. W. Hodges, local manager; Wm. Yolen Williams, consulting engineer; O. B. Smith, Jr., mine superintendent; W. A. Williams, smelter superintendent; J. C. McDonald, master mechanic; C. M. Campbell, engineer.

Organized March 29, 1901, under special act of the Provincial Parliament of British Columbia, with capitalization $15,000,000, shares $10 par, changed, 1906, to $15,000,000, shares $100 par, 1 share of new stock being issued for 10 of old. Issued, $13,500,000. Stock is listed on the Boston stock exchange. Fiscal year ends June 30. Boston Safe Deposit & Trust Co., registrar; American Loan & Trust Co., Boston, and Title Guaranty & Trust Co., New York, transfer agents. Annual meeting, first Tuesday in October.

Regular dividend rate is 8%, or $2 quarterly. First dividend, 1%, was paid Dec 16, 1903, and dividends have been as follows: $133,630.30 in 1903; none in 1904; $399,991 in 1905; $1,620,000 in 1906, and $1,215,000 in 1907. Dividends were resumed June, 1908, with a declaration of $2.

Lands, 43 claims, area 1,100 acres, crown-granted, also 500 acres of mill and smelter sites, and 500 acres miscellaneous lands, principal properties being in the Osoyoos mining field, Boundary division, Yale district of British Columbia, very near the United States line. Lands include the Old Ironsides, Knob Hill, Victoria, Grey Eagle, Banner, Tip Top, Triangle, Gold Drop, Curlew, Monarch, Tamarack, Monte, No. 13 and other claims and groups, forming a compact tract of about 8,000′ by 9,000′, giving nearly 2 miles of the strike of the mineralized zone. Miscellaneous landed holdings include a 61-acre limestone quarry, for flux, several hundred town lots, at Grand Forks and Phœnix, and 500 acres of land at Carson, British Columbia.

The property shows diabase and tuffs carrying two wide ore bodies in quartz-diorite, which apparently are altered volcanic tuffs, main ore body having an approximately north and south strike, with a surface dip of 60° to the eastward, and somewhat flatter dip at depth. The main ore body is stated by company as of 80′ average width, which is an ultra-conservative estimate, as actual figures of width are 100′ to 400′, with an average of nearly quite 200′. The main ore body has been developed for about 4,000′ in length, and opened to depth of 900′, while its continuity has been proven, by diamond drill borings, to depth of 1,100′. *To May 1, 1908, the company had drilled 29,117′ of holes. Ore is exclusively chalcopyrite, averaging about 1.7% copper only, with an average of 0.4 oz. silver and $1.50* gold per ton. The

carries 35 to 40% silica, 14 to 17% iron, 18 to 20% calcium carbonate, 3 to sulphur and circa 7% alumina and 7% magnesia, constituting an almost i self-fluxing ore.

The mine is opened by shafts of 200′, 400′, 350′, 500′ and 100′, the Victo Ætna and Monarch being the more important, and by tunnels of 1,500′, 3,(3,000′, 2,500′, 900′, 500′ and 800′, with about 11 miles of underground worki Principal extraction, however, is from immense open-pits, or glory-holes, great width of the ore body rendering open-cast extraction advisable. underground openings, 1907, were 9,701′. The largest pit is 400x1,000′ in a and the plans of the company practically call for the mining off of an en mountain. Ores stoped on the various tunnel levels are milled, thro chutes, to lower levels, with electric haulage on the 200′, 300′ and 400′ le which are double-tracked and have 75-h. p. motors drawing 10-ton ore These tunnels are equipped, at their portals, with ore-crushers and bin 2,000 to 3,000 tons capacity each, there being 3 crushers of 150 tons ho capacity each. No. 3 tunnel has a 22x55′ crusher-house, with a 30x42″ Fa Bacon crusher driven by a 100-h. p. electric motor, capable of breaking ma of nearly a cubic yard in size to chunks not larger than 7″ to 8″. The 3 h crushers weigh 113,000 lbs. each, and have frames of semi-steel, with a te strength of 32,000 lbs. to the square inch.

No. 1 shaft is being broken into an open pit, and the shafthouse has b demolished.

No. 2 shaft has a 12x16″ double cylinder hoist.

The 3-compartment Victoria shaft, 400′ deep, is the main working s of the mine. Ore is raised by a 250-h. p. electric hoist, operating 7-ton s in counterbalance, and the shaft has a daily productive capacity of 3,000 t Equipment at the Victoria includes a 250-h. p. Rand double-conical-drum h good for 1,000′ depth, driven by a Westinghouse 3-phase variable speed duction motor, and an air-compressor. The Victoria equipment includ crusher of 150 tons hourly capacity, conveyor and 3,000-ton bins, conne with the Canadian Pacific and Great Northern railways.

The Gold Drop-Curlew group has been developed extensively, sho good ore bodies, and is being equipped very substantially for a large duction.

The Independence group, at the head of Bear Creek, in the Similkam district, held under a $100,000 bond, has a vein in schist and granite, tra 1,000′, carrying mainly low grade ore, with some chutes of ore of higher gr in copper, with fair gold and silver values. The ore of the Independence much similar to that of the main group of the Granby.

Ore reserves of the Granby were estimated, 1904, by the company, 20,000,000 tons, but actually were much larger, and since have been added greatly. Ore is handled automatically, from the time of blasting until blister copper is ready for shipment at the smelter, without being touched human handls.

Electric power is used throughout the mine and works, about 2,000 h being required at the mine, and 3,000 h. p. at the smelter. Commercial rent is taken from the West Kootenay Power & Light Co., which has a hyd electric installation at Kettle Falls, on the Columbia river, in Washington.

Equipment at the mine, from the plan of operations, which provides extraction mainly from open-cast workings and through tunnels, is adequa but by no means comparable to most large copper mines, which are under necessity of hoisting practically all of their ore through shafts. Equipm includes two 200-h. p. and two 250-h. p. hoists, good for 1,000′ depth ea *The compressor* house, 60x121′ in size, has 2 electric air-compressors, the lar *of 60-drills* capacity, both machines being driven electrically, by rope tra

mission, from two 700-h. p. Westinghouse type C induction motors. The principal compressor is a 60-drill Rand tandem-compound engine, with 16x30" high-pressure cylinders and 28x36" low-pressure cylinders, with piston efficiency of 6,000 cubic feet of free air per minute, at 70 lbs. pressure.

Mine buildings include a 40x80' machine shop, 40x50' smithy and a 40x40' carpenter shop, all of wood. The company owns 20 dwellings and 2 hotels at Phœnix, the Granby hotel being a 3-story structure with electric light and steam heat, costing $25,000.

The mine is connected with the smelter, 24 miles distant, by 2 railways, the Canadian Pacific and the Great Northern. By means of extensive ore-bins at the Victoria shaft and various tunnels, a train of 35 thirty-ton cars can be loaded in 25 minutes, or less.

The smelter is much the largest and best in Canada, and among the reduction plants of the world is second only to the great Washoe works of the Anaconda, being of about the same size as the smelters of the Copper Queen and Boston & Montana. The plant is of 5,000 tons daily capacity, and has been enlarged repeatedly, with every prospect that eventually it will reach a capacity of not less than 10,000 tons daily. The smelter works 8-hour shifts.

The works have steel bins with storage capacity for 8,000 tons of coke and 13,000 tons of ore. Charging is by 4 electric locomotives, each drawing two 2-ton cars, constituting a single charge. The ore is practically self-fluxing, and with the addition of a little limestone and necessary fuel is charged as it comes from the mines, without concentration or assortment.

The steel blast-furnace building, rebuilt 1907, had six 44x160" furnaces, of 300 tons daily capacity each, and two 48x208" furnaces, latter added in 1905. The 6 old furnaces were rebuilt first to size of 44x212", and in 1908 were rebuilt again, with an addition of 4' 4" in length, rendering them 44x264" in length, and the 2 larger furnaces were rebuilt to size of 48x264", giving an average daily capacity of 625 tons for each of the 8 furnaces.

The furnace building has a brick dust-flue, 10x11x800', and a steel dust-chamber was added, 1907. This sets 22' above the feed floor, on foundations of steel columns, masonry and concrete, and is 13' wide, 15' high and 313' long, with a floor of 28 hoppers, having a conveyor underneath for flue-dust. Slags, formerly granulated, are now dumped hot, by 8x14" locomotives traversing a 36" slag-line.

The first fusion product is a 40% matte, which is taken, in ladles, by a 30-ton electric traveling crane, to the converter building, of steel, 68x240' in size, which stands 100' from the cupola building. The old converter department had 3 stands, with shells 70x100", which have been replaced by 4 stands, each operated electrically by a 25-h. p. motor, and ten 96x132" shells. There are 3 mould carriers under each stand, and product is a blister copper of 99% metallic tenor, including an average of 40 oz. silver and 7 oz. gold per ton, which is sent to the Laurel Hill works of the Nichols Copper Co. for electrolytic refining and parting of gold and silver values. The lining department, in the converter building, has a crusher and 2 silica mills.

The power house at the smelter, remodeled 1907, has brick walls and a steel roof. Electric power is used throughout, equipment including 9 small blowers and 2 Connersville Jumbo blowers, with capacity of 100,000 cubic feet of free air per minute, driven by two 300-h. p. motors. Converter blast is furnished by an Allis-Chalmers double-cylinder air-compressor, with capacity to reduce 10,000 cubic feet of free air per minute to pressure of 15 lbs. per square inch, driven by a 500-h. p. direct-connected electric motor. Old blast-pipe lines have been replaced by new pipes of much greater capacity.

Miscellaneous buildings at the smelter include a warehouse, roundhouse

and shops, of steel frame. There also is a 100,000-gallon steel storag for water.

One of the principal disadvantages under which the Granby has la almost from the start, has been an inadequate coke supply. To obviat trouble the International Coal & Coke Co. was organized, 1903, with a talization of $3,000,000, by practically the same shareholders as those Granby, though the corporations are distinct. This company has ext deposits of high grade coking coal, at Blairmore, Alberta, assuring the G a fairly regular supply of coke, barring labor troubles and accidents, t fuel shortages continue a disturbing factor in the operation of the smelte

For fiscal years, ending June 30, net profits have been as fol $712,649 in 1905; $1,823,617 in 1906; $1,924,937 in 1907; $606,522 in The expenditures for the fiscal year 1908 included $242,574.50 for con tion and equipment, at the mines and smelters, and $23,742.65 for pur of lands. The company's net surplus, 1908, was $2,455,180.77, incl $421,625.01 cash and copper, and $1,008,012.68 in stocks, bonds and bil ceivable.

Production, for fiscal years ending June 30, has been as fol 14,237,622 lbs. fine copper, 212,180 oz. silver and 42,884 oz. gold in 19,939,004 lbs. copper, 316,947 oz. silver and 50,020 oz. gold in 1906; 16,4 lbs. copper, 257,378 oz. silver and 35,083 oz. gold in 1907; 21,162,926 lbs per, 300,593 oz. silver and 40,139 oz. gold in 1908. The production for year 1908 was secured from 854,432 dry tons of Granby ore, and 24,17 of custom ore smelted. Production for calendar year 1907 was 15,514,00 fine copper, compared with 19,563,949 lbs. fine copper for calendar year Net cost of copper, after deduction of gold and silver values, was 8.35 per pound for fiscal year 1906; 10.14 cents per pound for fiscal year 190 10.24 cents per pound for fiscal year 1908. The Granby has by no reached its productive limit, and while it may take some years to rea output of 50,000,000 lbs. fine copper, this figure would seem reasonably to predict. The property, while very low in grade, has remarkably cheap for mining and smelting, due partly to nature and partly to good manage and the ore reserves are among the greatest in the world. The manag is thoroughly efficient and capable in all departments.

GRAND ARIZONA COPPER CO. ARIZ

Letter returned unclaimed from former mine office, Douglas, Cochis Ariz. Lands, near Douglas, are said to be extensive, and, 1907, were explored for copper.

GRAND CANYON COPPER CO. ARIZ

Dead. Formerly at Grand View, Coconino Co., Ariz. Described Vol

GRAND CENTRAL MINING CO. ARIZ

Office: 43 Exchange Place, New York, N. Y. Mine office: T Pima Co., Ariz. Geo. H. Daily, president; Chas. Peck, secretary; Fre Kopper, Jr., treasurer. Capitalization $1,000,000, shares $1 par. Lan claims, 14 miles northwest of Tucson, in the Tucson Mountains, having shaft, with about 300′ of workings, showing auriferous and argentif copper and lead ores.

GRAND CENTRAL MINING CO. U

Provo, Utah. Mine office: Robinson, Juab Co., Utah. Lafayette brook, president; C. E. Loose, manager; Patrick Donnelly, superinten Organized under laws of Colorado, with capitalization $250,000, shares $1 and paid dividends, to end of 1905, of $986,250. Mine carries mainly s *lead ore*, with appreciable values in copper, and is an old property, extens *developed*, and a considerable producer. Output, 1907, was 284 carloads o

GRAND CONSOLIDATED DEVELOPMENT CO. **ARIZONA.**

Office: care of Col. John T. Fireh, secretary, Oakland, Cal. Mine office: Kingman, Mohave Co., Ariz. Geo. W. Brown, president and treasurer; Dr. John T. Davis, vice-president and manager. Mine has veins of 3' to 60' width, carrying gold, silver and copper ores, with quartz gangue, and has secured assays up to 34% copper, 9 oz. silver and $12 gold per ton. Also has claims near Cerbat, opened by tunnel, giving ore assaying 70% lead, 12 oz. silver and $1 gold per ton.

GRAND DEPOSIT COPPER CO. **NEVADA.**

Mine office: Cherry Creek, White Pine Co., Nev. John Stanton, president; J. S. Page, secretary; Pierre de P. Ricketts, treasurer. Organized 1903. Lands, known as the Grand Deposit group, are said to show considerable ore bodies, giving assays of 7 to 12% copper. Idle.

GRAND GULCH COPPER MINING CO. **ARIZONA.**

Office: care of Messrs. Schirmer, Chapin & Emmons, 79 Milk St., Boston, Mass. Mine office: St. George, Washington Co., Utah. Samuel Newhouse, general manager; Isaac Jennings, superintendent. Property, in Coconino county, in the extreme northern part of Arizona, is more accessible from Utah than from southern or central Arizona. Mine has auriferous and argentiferous copper ores, with a 370' main shaft. Shipment of 1,000 tons of ore to Salt Lake smelters gave average returns of 48% copper, netting $99,970. Ore was carefully selected, and hauled 140 miles by wagon. Equipment includes gasoline power and a small and antiquated smelter.

GRAND GULCH MINING CO. **ARIZONA.**

Dead. Succeeded by Grand Gulch Copper Mining Co. Formerly at St. George, Washington Co., Utah.

GRAND JUNCTION SMELTING CO. **COLORADO.**

Letter returned unclaimed from former office, 79 Milk St., Boston, Mass. Works office: Grand Junction, Mesa Co., Colo. I. N. Patterson, president; J. T. Everard, secretary; Thos. Osborne, superintendent. Property is a 125-ton smelter, incomplete, which it was planned to blow in, 1905. Is closely related to Eastern Slope Copper Mining & Smelting Co. Management apparently inexperienced and reckless. Property mortgaged, and company's affairs apparently hopelessly involved.

GRAND LA SAL MINING CO. **UTAH.**

Office: Provo, Utah. Mine office: Castleton, Grand Co., N. M. Jacob Ivins, president; J. W. Beasley, vice-president; J. F. Van Wagenen, secretary and treasurer. Organized circa December, 1906, with capitalization $50,000. Lands, in the La Sal Mountains, have circa 250' of workings, showing auriferous and argentiferous lead and copper ores.

GRAND MARAIS COPPER MINING CO. **MINNESOTA.**

Dead. Formerly at Grand Marais, Cook Co., Minn.

GRAND MOUNT LYELL COPPER CO., LTD. **TASMANIA.**

Mine office: Mt. Lyell, Montagu Co., Tasmania. Lands, sundry claims, in Sections 68, 789 and 1674, slightly prospected. Idle several years and apparently moribund.

GRAND NATIONAL SMELTING CO. **MEXICO.**

Mine office: San Juan de Allende, Rio Grande, Coahuila, Mex. The property, known as La Reforma, carries auriferous copper ore.

GRAND PRIZE COPPER MINING CO. **ARIZONA.**

Dead. Lost lands, 1902. Formerly at Payson, Gila Co., Ariz.

GRAND RAPIDS COPPER CO. **WYOMING.**

Dead. Sold lands to *Saginaw Valley Copper* Mining Co. Formerly at Saginaw, Carbon Co., Wyo.

GRAND REEF COPPER MINING CO. A

Office: care of Clarence H. Mackay, 253 Broadway, New Yo
Mine office: Aravaipa, Graham Co., Ariz. Large sums were expend
velopment and equipment, latter including a 3-stamp mill and 90-to
Idle for some years.

GRAND REPUBLIC COPPER MINING CO. CO

Office: 52-240 La Salle St., Chicago, Ills. Letter returned unclai
former mine office, Pearl, Larimer Co., Colo. W. A. McGuire, preside
Boisot, secretary and treasurer. Organized 1902, under laws of
with capitalization $1,500,000, shares $1 par. Is controlled by Sta
velopment Co. Lands, 7 claims, area 70 acres, in the Big Horn
miles south of Pearl, showing a 3′ paystreak, carrying some native
a schistose vein, cut at depth of 130′ by a 200′ shaft. Also has
ore body. Idle several years and is not regarded favorably.

GRAND TRAVERSE & ARIZONA MINING CO. A

Office: 129 East Front St., Traverse City, Mich. Letter ret
claimed from former mine office, Cave Creek, Maricopa Co., Ar
Smurthwaite, president; Geo. R. Ray, vice-president; Herbert Mont
retary and treasurer; preceding officers, Wm. Newman and Walter E
directors; Chas. F. Smurthwaite, general manager; A. Scharingron, m
intendent. Organized May 6, 1903, under laws of Arizona, with cap
$2,000,000, shares $2 par; issued, $1,670,000. Annual meeting, secon
in January.

Lands, 33 claims, area circa 660 acres, showing talcose and mi
the northern portion carrying a number of stringers and small veins,
erly portion showing one vein of 12′ to 15′ width, with a number
stringers, in diorite, carrying oxidized ores and sulphides, with so
on the northern part of the property, and native copper in the
mine. Development is by shafts of 70′, 392′ and 167′, with 105′ an
nels, estimated to show 17,000 tons of ore, with 2,000 tons blocke
which the bulk is leached ore, running 1 to 4% copper, with about
estimated by company to average 6 to 30% copper, circa 37.5 oz.
$30 gold per ton. Has a small steam plant, with 2 hoists, and sev
mine buildings. Nearest railroad is 35 miles. Company plans cont
velopment.

GRAND VIEW MINING CO. WASH

Dead. Lands sold, early 1907, to Night Hawk Mining Co. Fo
Loomis, Okanogan Co., Wash.

GRANDVIEW MINING & MILLING CO.

Office: care of L. W. Dutro, Memphis, Tenn. Is said to have
Utah, near the Colorado line, from which ore giving good assay valu
silver and copper has been secured. Idle.

GRANITE CREEK SMELTING & REDUCTION CO.

Dead. Formerly at Golconda, Humboldt Co., Nev.

GRANITE WELLS MINING CO. CAL

Office: 716 Lankershim Bldg., Los Angeles, Cal. Mine office:
San Bernardino Co., Cal. Lands show a stained quartzite capping, o
width, standing about 30′ above surface for 200′, underlaid by what
pany terms a pipe vein, of 2″ to 2′ width, between quartzite and syen
ing very rich ores, mainly cuprite, assaying 17 to 30% copper in
levels, turning to sulphide ore at depth of 250′. Company claims to
tons of very rich ore on the dump. Presumably idle.

***LA GRAN* PROVEEDORA DE COBRE, S. A.**

Is the Mexican incorporation of the Arizona-Mexican Copper C

GRANT CONSOLIDATED COPPER MINING CO. **WASHINGTON.**

Office: care of Geo. A. McLeod, Spokane, Wash. Mine office: Chesaw, Okanogan Co., Wash. A. D. McPhee, superintendent. Organized 1907, under laws of Washington, with capitalization $1,650,000. Is said to have expended about $90,000 on the property. Lands, 14 claims, on Copper Mountain, near Chesaw, opened by tunnel planned to be driven 1,500', cutting 2 strong veins of medium grade chalcopyrite, showing considerable ore. Shipped some ore, 1907, to Granby smelter, running about 6% copper and $4 gold per ton. Property considered promising.

GRANT COPPER MINING CO. **COLORADO.**

Dead. Formerly at Pearl, Larimer Co., Colo. Described Vol. VI.

GRAPHIC MINE. **NEW MEXICO.**

Office: care of Sherwin-Williams Paint Co., owner, Cleveland, Ohio. Mine office: Magdalena, Socorro Co., N. M. Jos. Brown, superintendent. Mine is opened by tunnel, showing a 65' vein with a 12' paystreak claimed to average 13% copper, which obviously is erroneous, ores being mainly smithsonite and galerite, with some cerussite and argentiferous galena, and occasional cuprite and native copper. Ores are mainly low in grade, requiring concentration. Property, worked for zinc, has an ore chute, of about 400' length, on the seventh, eighth and ninth levels, which is fully 100' wide on the ninth level. Shipped, 1907, a considerable tonnage of lead and zinc carbonates, lead ores going to the Luna Lead Co., at Deming, N. M., and zinc to the company's works, at Joplin, Mo.

GRASLITZER KUPFERBERGBAU. **AUSTRIA.**

Mine office: Eilenberg, Bohemia, Austria. Mines, which are very ancient, and were one of the principal sources of European copper supply during the Middle Ages, show a vein of 12' to 15' width, in clay-slate. Mines were reopened on a considerable scale, and a new smelter built, 1901, but have been idle for several years.

GRATIOT MINING CO. **MICHIGAN.**

Office: 12 Ashburton Place, Boston, Mass. Operating office: Calumet, Mich. Mine office: Mohawk, Keweenaw Co., Mich. Quincy A. Shaw, Jr., president; Rudolph Agassiz, vice-president; Geo. A. Flagg, secretary and treasurer; Jas. MacNaughton, general manager; preceding officers, Alexander Agassiz, Francis L. Higginson and Francis W. Hunnewell, directors. Organized Feb. 16, 1906, under laws of Maine, with capitalization $300,000, shares $5 par, fully paid. Is controlled, through ownership of stock, by Calumet & Hecla Mining Co. Ended fiscal year Apr. 30, 1908, with $12,213 cash and accounts receivable, with a debit to profit and loss of $68,654.

Lands, 600 acres, being the NW. ¼ of Section 26, NW. ¼ of Section 27, NW. ¼ of Section 23, and SE. ¼ of Section 22 except the NW. ¼ of the NW. ¼. Property lies south and east of the Seneca, and north and east of the Mohawk. Extensive diamond drill borings were made before shafts were started, and the property was found to carry the northern extension of the Kearsarge amygdaloid.

Development is by two 3-compartment shafts, exact duplicates, 9x22' inside of timbers, with ladderways in the middle, sunk at an angle of 36° on the Kearsarge bed, two shafts being sufficient to develop the entire tract. Levels are opened at 100' intervals.

No. 1 shaft is circa 620' deep, at the fifth level, and has a half-mile or more of drifts.

No. 2 shaft, 1,475' southwest of No. 1 and circa 2,000' north of the Mohawk boundary, is 720' deep, at the sixth level, with a fair showing of copper on the fifth level.

Shafts have duplicate equipment, including duplex-cylinder Lidgerwood

hoists, with 5′ drums, good for one-half mile each, and 15-drill air-compr... Each shaft has a single-compartment shaft-rockhouse, which can be enla... later, and stamp rock broken in development is put through crushers stocked. Buildings include a 30x40′ power-house, smithy, boarding house, Property considered promising, and management excellent.

GRAY COPPER MINING CO., LTD. **IDA...**

Mine office: Osburn, Shoshone Co., Idaho. W. H. Herrick, mana... Lands, on McFarren Gulch, 12 miles south of Osburn, show an ore body u... 12′ in width, carrying mainly argentiferous gray copper, and a 12″ vein c... ing high grade auriferous and argentiferous copper ore. Company plans s... ping ore.

GREAT AUSTRALIAN MINE. **AUSTRA...**

Mine and works office: Cloncurry, Beaconsfield Co., Queensland, Austr... Lands, west of Cloncurry, show a vein up to 15′ width, carrying a 3′ payst... of silicious sulphides ranging in copper tenor from 3 to 15%. Equipmen... cludes a 6-drill Schram air-compressor.

The smelter, built 1907, has 25-ton reverberatory furnace, and a b... furnace, blown in circa July, 1908, has 2 Connersville blowers, product b... matte of about 70% copper tenor. Production, 1907, was circa 100,000 ... fine copper, and for May, 1908, was about 80,000 lbs. fine copper.

GREAT BELCHER OF ARIZONA CO. **ARIZ...**

Office: 519-10 Wall St., New York, N. Y. Mine office: Provide... Yavapai Co., Ariz. Isaac W. Mason, president and treasurer; Henry B. ... ford, vice-president; P. H. Noel, secretary; T. S. Henderson & Co., ... agents; Geo. Rehpeter, superintendent. Organized under laws of Arizona, ... capitalization $5,000,000, shares $1 par, as a merger of the Great Belcher ... & Copper Co., Bullwhacker Mining Co., Empress Mining Co., Sunlight Mi... Co. and Queen of Arizona Copper Co. Lands, 2 claims, in the Big Bug dist... including the Great Belcher mine, 1 patented claim, said to have prod... $700,000 worth of ore in the past, having a 700′ three-compartment main s... and a 700′ tunnel, with about 4,000′ of workings, tunnel, on the 500′ level, c... cutting 9′ of low grade auriferous copper ore, claimed to carry an averag... $12 per ton, mainly in gold.

GREAT BELCHER-BULLWHACKER GOLD CO. **ARIZ...**

Dead. An abortive merger of properties later merged as the Great Bel... of Arizona Co. Formerly at Providence, Yavapai Co., Ariz.

GREAT BELCHER GOLD & COPPER CO. **ARIZ...**

Dead. Merged in Great Belcher of Arizona Co. Formerly at Provid... Yavapai Co., Ariz.

GREAT BEN HUR COPPER MINING & DEVELOPMENT CO., N. L. **AUSTRA...**

Mine office: Condobolin, Cunningham Co., N. S. W., Australia. Or... ized circa March, 1908, under laws of New South Wales, with capitaliz... £1,920, shares £15 par. Lands are at Burra Burra, near Condobolin.

GREAT CENTRAL MINE. **AUSTRA...**

Mine office: Mt. Hope, Blaxland Co., N. S. W., Australia. Lands, ... acres, at South Mt. Hope, showing large bodies of low grade ores, which ... oxides and carbonates to about 200′ depth, succeeded by chalcopyrite. ... dized ores have a decomposed porphyry gangue, sulphide ores occurrin... brecciated porphyry. Has steam power and a small smelter, but in oper... was hampered by a precarious water supply. Production, 1898, was 24... lbs. fine copper. Idle since 1903.

GREAT CENTRAL FREEHOLD MINES, LTD. **AUSTRA...**

Dead. Voluntarily liquidated, 1903. Formerly at Mt. Hope, Blaxland, *N. S. W., Australia.*

GREAT COBAR COPPER MINING SYNDICATE. **AUSTRALIA.**

Dead. Property was sold, 1906, to Great Cobar, Ltd. Formerly at Cobar, Robinson Co., N. S. W., Australia. Very fully described Vol. VI.

GREAT COBAR, LTD. **AUSTRALIA.**

Office: 65 New Broad St., London, E. C., Eng. Mine office: Cobar, Robinson Co., N. S. W., Australia. Works office: Lithgow, N. S. W., Australia. Employs 1,300 men. Andrew Haes, chairman; John D. Kendall, consulting engineer; preceding officers, Wm. Rich, R. H. Henning, W. A. Horn, T. M. Joseph Watkin, Gerard B. Elkington, J. P., and G. E. Baker, directors; Alexander Johnston, secretary; Geo. H. Blakemore, general manager; V. Farrier, mine superintendent; O. E. Iaeger, smelter superintendent.

Organized May 22, 1906, under laws of Great Britain, with capitalization £750,000, shares £5 par, fully issued. Debentures authorized, £750,000, first mortgage, at 6%, in denominations of £20, £50 and £100, redeemable by drawings at 5% premium, but repurchasable by means of a sinking fund, created 1908, by setting aside £100,000 annually from profits; issued, £550,000. A 15% dividend, amounting to £112,500, was paid Sept. 16, 1907. Net profits for first year were £238,431.

Property was bought May, 1906, of the Great Cobar Copper Mining Syndicate, but not taken over until September, 1906, for £1,006,000, of which £800,000 cash, was paid for the property, the promoters taking £206,000 in ordinary shares and debentures.

Lands, 577 acres, freehold, including the Great Cobar mine, 208 acres leasehold, including the Cobar Chesney mine, and a 12-acre smelter site, with total holdings of 1,263 acres. Property includes the Great Cobar, Cobar Chesney and Great Peak mines, latter a gold property at Cobar. The company also owns and operates the Rix's Creek colliery, producing good coking coal, and smelting and refining works at Lithgow. There was some trouble, 1906, over a block of 40 acres of ground, in the main tract, said to have been lost through oversight, though formerly part of the Great Cobar property.

The Great Cobar, which is the most important copper mine of New South Wales, was opened 1869, and closed 1892, after failure to reduce sulphides in a reverberatory furnace. Production, 1869-1892, was 26,611 tons fine copper, made from rich oxides, ores averaging 11.07% in copper tenor, and considerable dividends were paid therefrom. Mine was reopened, 1892, by tributors, on a 21-year lease, and at the close of 1902 had produced, under their management, 720,669 tons of ore giving average returns of 3.27% copper. A long-standing dispute between the tributors and the fee-owners was settled, 1903, through the purchase of the property by the former, who sold to the present syndicate.

Country rock, of Silurian clay-slate, shows 3 veins, of nearly vertical dip, known as the East, Middle and West lodes, principal workings being on the latter, which ranges 6" to 100' in width, carrying lenticular ore bodies. One of the principal parallel mineral zones is basic and the other acid, these lying about one-half mile apart. The principal ore bodies are 28', 38' and 52' in extreme width, with lengths of 135', 345' and 485', proven to depth of 1,000'. The oxidized zone extends to an average depth of about 250', below which the ore is mainly chalcopyrite, associated with pyrite and magnetite, with occasional bornite in the Great Cobar mine, ore being highly silicious and somewhat siliceous, of about 3.5% average copper tenor in the Cobar and 2.81% in Chesney, carrying an average of 0.5 oz. silver and 1.5 dwts. gold per ton. The Cobar Chesney, now worked in connection with the Great Cobar, shows a lenticular chute of 36' width and about 105' length, opened to 600', ore being chalcopyrite, with slate and quartz gangue.

Ore is won by *overhand stoping, with 10' pillars* left beside the shafts,

and timbering is by bulkheads filled with waste, this being known locally the "pigstye" system. Ore is first broken in immense masses, then redu to smaller size by block-holes and pop-shots. No. 1 shaft of the Cobar, 15 x 7 in size, is 1,000' deep, and the Barton shaft is of the same depth, these sh being connected by a drift, on the 1,000' level, which shows a strong vein to 5% in copper tenor. The mine has about 3 miles of workings.

The Cobar Chesney was opened as a gold mine, the outcrop carrying copper, but carbonate ore was found at depth of 155', and at 250' there chalcopyrite, coated with what was termed melaconite, but which prob was chalcocite. Main shaft, 697' in depth, shows ore carrying 2 to 8% cop and up to 3 dwts. gold per ton, with an estimated average tenor for the en Cobar Chesney mine of 2.81% copper.

Mr. Kendall estimates reserves of 1,500,000 long tons of ore blocked ou the Cobar, and 500,000 tons in the Cobar Chesney, besides 200,000 tons of near surface in the Great Cobar.

The Peak, or Great Peak, gold mine has a stamp-mill, and as the or silicious and free from iron and sulphur, it would seem a highly suitable for the basic ores of the Cobar and Cobar Chesney mines.

Buildings at the mines include wooden carpenter and machine sh smithies, offices and other necessary mine structures.

The company uses about 3,000 h. p. at the mine and smelter, inclu steam and electric installations, and has a 500-h. p. first-motion hoist, good 2,000' depth, at the "New" shaft, and two 25-drill air-compressors. boiler plant has Green fuel economizers, and, the district being arid, cau much trouble in dry seasons from lack of water, a 100,000,000-gallon dam been built, water costs averaging about 8s. per thousand gallons, and a sec dam, of 80,000,000 gallons capacity, was begun, 1908.

The reduction plant, at the mine, begun 1907, is planned to cost £100,000, and eventually will include a 250-ton sampling mill, for custom

The dressing plant has 2 centrifugal Heclon crushers, each of 120 hourly capacity, delivering ore to electrically driven belt-conveyors, wh take it to a 1,500-ton ore-bin, whence it is loaded into 30-ton cars and dr by electric locomotive to the main storage plant. The Cobar Chesney ha 10-stamp mill and 25-ton concentrator.

The smelter, of 1,000 tons daily capacity, has three 500-ton water-jac blast-furnaces, one being held in reserve, as a spare. Fuel is coke and c The converter department has 2 stands, with 84x126" shells of the Cop Queen type. Blast is supplied by 3 Connersville blowers, and it is plan handling slags with electric locomotives. Product of the smelter is blis copper, sent to the company's refinery at Lithgow.

The Lithgow works have five 100-ton water-jacket blast-furnaces, reverberatory furnaces. An electrolytic refinery, installed 1902, treats, in ad tion to the company's blister copper, material from other properties.

From 1876 to 1906, inclusive, the Great Cobar mine produced 1,592,895 l tons of ore, and made therefrom 61,872 long tons fine copper. Producti 1905, was 9,076,480 lbs. fine copper, and for 1906 was 9,027,200 lbs., and 1 is said to have shown a slight increase. From May 6, 1906, to Dec. 31, 19 production was 13,695,360 lbs. fine copper, 104,292 oz. silver and 17,166 gold, secured at a net profit of £238,431. For month ending Nov. 20, 1907, smelter treated 15,380 tons of ore, producing 365 long tons of copper, ci 5,600 oz. silver and circa 100 oz. gold, showing an average copper extract of 2.37%. The company plans bringing its ultimate production to ab 30,000,000 lbs. yearly. With ore secured under modern methods, and w good mining and smelting equipment, the property should earn substan *profits.*

GREAT COBAR NORTH, LTD. **AUSTRALIA.**

Offices: 26 Victoria St., London, S. W., Eng., and Equitable Bldgs., Sydney, N. S. W., Australia. Mine office: Cobar, Robinson Co., N. S. W., Australia. Maj.-Gen. Sir W. H. R. Green, K. C., chairman; D. A. Sutherland, manager; J. Delohery, mine manager; T. Carter, secretary. Organized Nov. 15, 1906, under laws of Great Britain, with capitalization £350,000, shares £1 par. Lands, 286 acres freehold, and 400 acres leasehold, adjoining the Great Cobar, Ltd., opened to depth of 500′, with crosscutting in progress at last accounts. Took over machinery of Australian Mining Estates, Ltd., also the 60-stamp mill of the Occidental gold mine, 3 miles from Cobar.

GREAT CONDURROW TIN & COPPER MINING CO., LTD. **ENGLAND.**

Dead. Dissolved, Jan. 13, 1905. Formerly at Camborne, Cornwall, Eng.

GREAT DIVIDE GOLD CO. **CALIFORNIA.**

Dead. Formerly at Redding, Shasta Co., Cal.

GREAT DIVIDE MINES CO. **UTAH.**

Office: 14 West First South St., Salt Lake City, Utah. Mine office: Lincoln, Tooele Co., Utah. Henry A. McCornick, president; Walter A. Cooke, vice-president and manager; Joseph H. Hurd, secretary; Rodney T. Badger, treasurer; John B. Taylor, superintendent. Organized Aug. 15, 1903, under laws of Utah, with capitalization $2,000,000, shares $5 par. Lands, 40 claims, about half patented, area 560 acres, also a 10-acre millsite, fairly timbered, showing fissures in and contacts between limestone and Cambrian quartzite, of which the main vein is said to range 12′ to 50′ in width, carrying ores said by company to assay 6 to 20% copper, 2 to 100 oz. silver and from a trace to $50 gold per ton. Development is by a 1,300′ tunnel. Development was begun 1903. Property considered promising.

GREAT FITZROY GOLD & COPPER MINES, LTD. **AUSTRALIA.**

Mine office: Mt. Chalmers, Queensland, Australia. C. H. James, superintendent. Organized 1907, under laws of Queensland, with capitalization £500,000; issued, £375,000. Mine, formerly known as the Mount Chalmers, has two-compartment shafts of 225′ and 240′. Vein on the 150′ level is 120′ wide and 250′ in known length, mine having estimated reserves of 600,000 long tons of ore averaging about 3 to 4% copper and 3 dwts. gold. Has a steam plant with 20-drill and 8-drill air-compressors.

The smelter has a 100-ton water-jacket blast-furnace, making matte, shipped to Mount Morgan for reduction. In May, 1908, the smelter treated 1,710 long tons of ore, yielding 73 long tons of copper and 378 oz. gold, costs being 5s. 11d. per long ton for mining, 9s. 11d. for smelting, and 11d. general expenses, or total costs, exclusive of development, of 31s. 6d. per ton of ore. Mine and works employ about 100 men. Production, 1907, is estimated at 1,650,000 lbs. fine copper. At last accounts company planned reconstruction, to raise additional capital.

GREAT HERMIDALE COPPER CO. **AUSTRALIA.**

Dead. Absorbed, circa January, 1908, by Great Hermidale South Copper Co. Formerly at Hermidale, N. S. W., Australia.

GREAT HERMIDALE SOUTH COPPER CO. **AUSTRALIA.**

Mine office: Hermidale, N. S. W., Australia. Absorbed, circa January, 1908, by the Great Hermidale Copper Co. Has a 370′ main shaft.

GREAT HOPE MINING CO. **CALIFORNIA.**

Office: care of Geo. R. Whitcomb, secretary and manager, Los Angeles, Cal. Letter returned unclaimed from former mine office, Mojave, Kern Co., Cal. Chas. C. Davis, president; J. C. Cribb, vice-president; Z. L. Parmelee, treasurer, preceding officers and E. J. Peabody, *directors*. Is an unincorporated syndicate, *organized circa 1905, with capitalization* $10,000. Is developing by

tunnel, and has secured assays up to 10% copper, 8% lead and 3 oz. silver p ton. Idle.

GREAT LAKES COPPER CO. ONTARI

Office: 51 East 44th St., New York, N. Y. Mine office: Sudbury, A goma, Ont. John McKinley, president; Horace Williston, secretary; Robe Sloane Bickford, treasurer. Organized 1900, under laws of West Virginia, wi capitalization $3,000,000, shares $5 par. Lands, upwards of 4,000 acres, ne Sudbury, carrying nickeliferous chalcopyrite, associated with pyrite. H several shafts, deepest 150′, also an open-cut, with a considerable amount ore in sight. The Graf smelting process was tried, but proved a failure. Pro erty is mortgaged. Charter was forfeited, 1903, because of non-payment corporation tax, and company seems hopelessly involved.

GREAT LAKES MINING & MILLING CO. WYOMIN

Dead. Formerly at Encampment, Carbon Co., Wyo.

GREAT LAKES MINING & SMELTING CO. WYOMIN

Dead. Formerly at Encampment, Carbon Co., Wyo. Described Vol.

GREAT LAXEY, LTD. ENGLAN

Offices: 55 Cross St., Manchester, Eng. Mine office: Laxey, Isle Man, Eng. F. J. Robertshaw, chairman; John Roberts, mine manager; Crossley, secretary. Organized March 3, 1903, as a reconstruction of the Gr Laxey Mining Co., Ltd., with capitalization £30,000, shares 10s. par, in 45,0 cumulative 10% preferred and 15,000 ordinary shares. Lands, 1,103 acr held under 31-year leases, expiring October, 1933, with royalty of one-eighti to October, 1907, and one-fortieth thereafter. Lands carry lead, zinc a copper sulphides. Property had the largest water-wheel in the world, but t survived its usefulness and was displaced by a new power plant.

GREAT MAMMOTH COPPER MINING CO. WASHINGTO

Dead. Formerly held 10 claims, under bond and lease. Promoters s their own stock and pocketed the proceeds, company losing its lands. F merly at Index, Snohomish Co., Wash.

GREAT MOUNT LYELL COPPER CO., LTD. TASMAN

Dead. Reorganized, Jan. 23, 1903, as Ballarat & Lyell Mines, Ltd. F merly at Mt. Lyell, Montagu Co., Tasmania.

GREAT NORTHERN COPPER CO. MINNESO

Office: 204 Globe Bldg., St. Paul, Minn. Mine office: Hinckley, P Co., Minn. J. B. Conger, vice-president and general manager; R. V. Peyt secretary; H. C. Boyeson, treasurer; Wm. Kibbee, superintendent; preced officers, S. O'Dea, Godfrey Dawe, G. O. Riggs, Dr. C. D. Snow and J. A. F enbeck, directors; August Zastrow, mine superintendent. Organized Sept. 1907, under laws of Arizona, with capitalization $1,000,000, shares $1 p issued, circa $700,000.

Lands, 160 acres, freehold, 14 miles east of Hinckley, showing trap fl with 7 amygdaloidal beds carrying native copper, and occasional malach from weathering, property being on the western extension of the Keweena formation of Lake Superior. Two amygdaloids under development, of ab 8′ average width, traceable circa 1,500′, are opened by shafts of 60′, 100′ 60′, giving rock assaying up to 4.8% copper, and estimated by company carry an average of 3% copper and 6 oz. silver per ton.

Has a 90-h. p. steam plant, with an 8x10″ double hoist, good for 1,0 depth, and 6 mine buildings, including a 20x30′ wooden machine-shop. C pany has secured some good-looking copper rock and plans continuing de opment.

GREAT NORTHERN COPPER CO. NEWFOUNDLA

Office: Corey & Braddock Aves., Braddock, Pa. Mine office: Twilling *Newfoundland.* Development is by a short tunnel. Presumably idle.

T NORTHERN COPPER & GOLD MINING COMPANY OF QUEENSLAND. AUSTRALIA.

ad. Reorganized July 31, 1903, as Rosewood Creek Copper & Gold Min-, Ltd. Formerly at Rosewood Creek, Queensland, Australia.

T NORTHERN COPPER MINING CO. UTAH.

ice: care of S. H. Browne, secretary and treasurer, Ogden, Utah. A. Gee, president; Daniel Covery, vice-president. Organized 1904, under Utah, with capitalization $100,000, shares $1 par. Lands are in the Madre district of Box Elder county, Utah. Presumably idle.

T NORTHERN DEVELOPMENT CO. ALASKA.

ice: 111 Broadway, New York, N. Y. Mine office: McCarthy Creek, River district, Alaska. Jas. Phillips, Jr., director. Capitalization, said $1,000,000. Property is sundry copper claims, in the vicinity of the a group, slightly developed. Company is awaiting railroad transporta- fore doing permanent work.

T NORTHERN GOLD & COPPER MINING & MILLING CO. OREGON.

ne office: Lostine, Wallowa Co., Ore. E. T. Sluer, superintendent. 13 claims, south of Lostine, said to show high grade copper-silver ores.

T NORTHERN MINING CO. WASHINGTON.

ad. Formerly at Baring, King Co., Wash.

T PECK MINE CO. ARIZONA.

ice: 519-10 Wall St., New York, N. Y. Mine office: Providence, i Co., Ariz. Hon. J. A. Beidler, president; Hon. James Tawney, secre- nd treasurer; preceding officers, Hon. E. A. Minor, Hon. Herman G. , Hon. James H. Southard, Hon. Wm. E. Brown, Hon. Lucius N. Littauer, . W. Babcock, Wm. E. Bixby and Melville Woodbury, directors; Peter , general manager. Knickerbocker Trust Co., New York, registrar. Or- 1 1902, under laws of Arizona, with capitalization $2,500,000, shares . Lands, 2 claims, area 40 acres, patented. Mine, once a considerable producer, until closed by litigation, has about 5,000′ of workings, carry- d, silver and copper values. The new Clifford shaft is 375′ deep. Past tion is reported as about $3,000,000. Officers are principally representa- n the American Congress.

T REPUBLIC COPPER & GOLD MINING CO. ARIZONA.

ice: New Philadelphia, Ohio. Mine office: Turkey, Yavapai Co., Ariz. l Siebold, president; L. E. Stegner, vice-president; Fred Graff, secre- C. D. Grimes, treasurer; preceding officers, Wm. Rommell and S. S. , directors; Geo. Oakman, general manager. Organized May 1, 1901, laws of Arizona, with capitalization $3,000,000, shares $1 par; issued, 2,300,000. Annual meeting, first Tuesday in September.

nds, 33 claims, area 660 acres, and a 20-acre smelter site, in 3 groups, s from Turkey, in the Black Cañon district. Property shows chloritic and diorite, carrying fissure veins showing occasional native copper alachite, but mainly azurite, chalcopyrite and bornite, estimated by y to average 4% copper, 3.5 oz. silver and from a trace to $6 gold per Development is by shafts of 726′, 200′ and 200′, with various pits of 10′ depth, and tunnels of 87′ and 314′. Has 15-h. p. and 40-h. p. gasoline with 7 mine buildings. Company plans installing a new hoist and air- ssor, and deepening the Sullivan shaft.

T STANDARD COPPER MINING CO. WYOMING.

ice: care of Colonial Security Co., 161 Summer St., Boston, Mass. returned unclaimed from former mine office, Granite Cañon, Laramie yo. Dr. Walter H. Parker, president; John Laughrey, vice-president and l manager; Chas. B. Lamont, *secretary*. Organized Sept. 30, 1902, under

laws of Arizona, with capitalization $1,000,000, shares 50 cents p
17 claims, also miscellaneous lands giving total holdings of 640 a
Silver Crown district, said to show 6 veins of about 8' average wi
by 18 shallow shafts and pits, claimed to give average assays o
copper, from oxides, carbonates, sulphides and chlorides, with occasi
copper. Idle since March, 1904, from lack of funds; has an overdu
and seems not long for this world.

GREAT SULPHIDE COPPER CO.

Mine office: Silver Bell, Pima Co., Ariz.

GREAT VERDE CONSOLIDATED MINE. CA

Office and mine: Sisson, Shasta Co., Cal. Is a copartnership o
capitalized at $20,000. Lands, 12 claims, unpatented, claimed to
Balaklala, but actually adjoining the Shasta King group of the T
per Co., claimed to show an ore body of 80' width, claimed to be o
tunnels, longest 600', claimed to carry chalcopyrite assaying 6% c
silver and $7 gold per ton. Is not known ever to have produce
statements to the contrary notwithstanding. Idle.

GREAT WESTERN COPPER CO.

Office: Clinton, Ia. Mine office: Tombstone, Cochise Co., Ari
Young, Jr., president; Edward Young, secretary. Capitalization
Lands, 23 claims, in the Dragoon Mountains, carrying argentifer
ores. Has steam and gasoline power. Is said to have resumed
April, 1908, after several years' idleness.

GREAT WESTERN COPPER CO.

Letter returned unclaimed from former office and mine, Globe
Ariz. Lands, near the head of Mineral Creek, show copper ore of fai
a little ore was shipped, 1906, to the Old Dominion smelter. Idle.

GREAT WESTERN COPPER CO. M

Dead. Formerly at Butte, Silver Bow Co., Mont. Described V

GREAT WESTERN COPPER CO.

Dead. Was a stock-jobbing enterprise. Formerly at Reno, W
Nev. Described Vol. VI.

GREAT WESTERN GOLD CO. CA

Office: 401 Commercial Bldg., St. Louis, Mo. Mine and w
Ingot, Shasta Co., Cal. T. S. Henderson, president; T. H. Adams,
dent; M. E. Dittmar, managing director; C. J. Balmer, secretary and
S. E. Bretherton, general manager. Organized circa 1901, with ca
$10,000,000, increased, circa 1905, to $12,000,000, shares $1 par. M
takes vigorous exception to criticisms in past issues of the Copper
to the effect that it evades all inquiries as to capitalization and fi
continues to evade these points, while professing the utmost will
furnish information.

Lands, circa 1,600 acres, patented, including the Afterthought
459 acres, and the Liberty, Last Chance, Section 15, Bull and 10 ot
and, at last accounts, a bond and lease was held on the Donkey mi
on the Garcia mine, Arizona, was forfeited. Principal properties are
thought, Copper Hill and Copper Grand. Ten of the Afterthought
patented, and the River group, 3 claims, is patented. Lands are o
side belt, which extends from Ingot to DeLamar, and is entirely dis
the copper belt on the western side of the Sacramento river.

The Afterthought mine, in the Furnaceville district, 20 miles ea
ding, is the principal property. Former developments included a
and 7 tunnels, of about 2,000' aggregate length. Present main tunn
2,500' long. Property shows a considerable body of low grade sul
with occasional occurrences of medium and high grade sulphides,

alcopyrite, associated with sphalerite and pyrite. The main working tunnel ts a 24′ ore body, in the Copper Hill mine, with a back of 500′. The Lib- ty group, near Redding, with title apparently in dispute, carries auriferous pper ore of undetermined value. The company's claims that the ore would erage $30 per ton in value have been disproven by the results of actual elting. In 1905 the ores smelted assayed 2.81% copper, 14.3% zinc, 11.6% on, 20.25% sulphur, 5.3% alumina, 7.4% barium sulphate, 5.4% calcium car- onate and 18% silica. The property has considerable zinc ore assaying 25 40% in tenor.

The smelter, 1 mile north of Cow Creek and 1½ miles north of the mine, onnected therewith by a tram-line of 30″ gauge, was blown in March 24, 905. The works have 40x96″ and 42x150″ blast-furnaces, latter with Brether- on hot-blast furnace and 12 tuyeres on a side, blast being furnished by 2 isdon hot-blast stoves. The larger furnace is rated at 500 tons' daily ca- pacity. The smelter has 2 brick dust-chambers, and matte produced was hipped to Utah for conversion.

Much trouble was had with the first furnace, which worked badly, and it was said that the management planned building a bag-house to recover zinc oxide from the smelter fumes. Under the management of Mr. Bretherton, who took charge later, the blast-furnace was run with a low charge and an exceptionally hot top, on account of the excess of barium sulphate, and is said to have given satisfactory results.

Work was begun, circa August, 1907, on a 14-mile standard-gauge rail- road, to be known as the Redding, Afterthought & Northeastern, to connect with the Southern Pacific at Bella Vista, and the smelter was idle, August, 1908, awaiting the completion of this road, which should greatly reduce oper- ating costs.

The company was promoted by T. S. Henderson & Co., a St. Louis broker- age firm of dubious reputation, and the early financing of the Great Western Gold Co. was not of a nature to recommend the property to conservative in- vestors. The company has evaded making any definite statements regarding its organization or finances, but a semi-official statement has been secured to the effect that to Aug. 1, 1908, the company had produced nearly $1,000,000 in copper, silver and gold. The local management seems good, and Mr. Hen- derson, notwithstanding the criticisms previously made, is entitled to the credit of sticking to the proposition, which is not devoid of merit, though it seems a question whether the Afterthought should be called a copper mine or a zinc mine.

GREAT WESTERN GOLD & COPPER CO. **UTAH.**

Office: Provo, Utah. Mine office: Park City, Summit Co., Utah. Jesse Knight, president; W. Lester Mangum, secretary; Rt. Rev. Robert Brighton, general manager. Lands, at the head of Big Cottonwood Cañon, adjoining the Daly Judge, show a ledge of about 100′ width, giving assays of 3 to 5% cop- per. Development is by tunnel, planned to cut the ledge at about 2,000′ depth.

GREAT WESTERN GOLD & COPPER MINING CO. **MONTANA.**

Office: care of W. J. Willingham, Equitable Bldg., New York, N. Y. Mine office: Butte, Silver Bow Co., Mont. Chas. G. Eckert, president. Organized under laws of South Dakota, with capitalization $500,000, shares $1 par. Lands, 1 claim, area 20 acres, near Butte. Formerly had a bond and lease on a gold claim at Cripple Creek, Colo. Idle and apparently moribund.

GREAT WESTERN GOLD & SILVER CO. **ARIZONA.**

Mine office: Dragoon, Cochise Co., Ariz. Organized circa June, 1908, pos- sibly as successor of Great Western Copper Co. Lands, in the Dragoon Moun- tains, show auriferous and argentiferous lead and copper ores.

GREAT WESTERN MINING, MILLING & SMELTING CO., LTD. **IDAHO.**

Mine office: Pocatello, Bannock Co., Idaho. O. D. Hovey, superintendent. Has copper ores and was developing with a small force at last accounts.

GREAT WESTERN ORE PURCHASING & REDUCTION CO. **CALIFORNIA.**

Works office: Keeler, Inyo Co., Cal. Has a 150-ton smelter, built 1906, and is said to own old mines in the Cerro Gordo district.

GREENBACK COPPER CO. **CALIFORNIA.**

Mine office: Woody, Kern Co., Cal. Lands, 1,520 acres, 18 miles from Southern Pacific railroad. Country rock is grano-diorite, showing an ore chute carrying lenses of 20′ maximum width, with granite walls irregularly impregnated with chalcopyrite. Development is by a 185′ incline shaft, with 3 levels opened. Carbonate ores stoped from the upper levels have averaged 19.4% copper and 5.7 oz. silver per ton. Idle 1900-1905, and presumably again idle.

GREEN COPPER CO. **MONTANA.**

Dead. Was put out of business, 1906, by an injunction, secured by the Amalgamated Copper Co., restraining the Green from mining property claimed by the Amalgamated. Formerly at Butte, Silver Bow Co., Mont.

GREEN DRAGON COPPER CO. **CALIFORNIA.**

Dead. Was organized, early 1907, by Nevada Counties Brokerage Companies, of San Francisco, and merged, circa September, 1907, in Copper Mines & Smelters Corporation of America. Formerly at Greenwater, Inyo Co., Cal.

GREENE CANANEA COPPER CO. **MEXICO.**

Office: 511 Lyceum Bldg., Duluth, Minn. Mine and works office: La Cananea, Arizpe, Sonora, Mex. Thos. F. Cole, president; Chas. A. Duncan, vice-president and treasurer; Chas. D. Fraser and Jos. B. Cotton, vice-presidents; preceding officers, Myron M. Parker, Philip L. Foster, Chester A. Congdon, Chas. d'Autremont, Jr., Capt. Jas. Hoatson and John D. Ryan, directors; Frederic R. Kennedy, secretary; Jos. W. Allen and Daniel R. Smith, assistant secretaries; Wm. G. Hegardt, assistant treasurer; Arcadius L. Agatin, general solicitor; Dr. L. D. Ricketts, general manager; David Cole, assistant general manager; Jas. H. Kirk, mine superintendent; E. C. Cole, assistant smelter superintendent; Frank J. Strachan, mill superintendent; Geo. Young, mercantile superintendent; T. Evans, traffic manager; T. R. Lucas, purchasing agent; J. A. Campbell, public service superintendent.

Organized Dec. 26, 1906, under laws of Minnesota, with capitalization $60,000,000, shares $20 par; issued, $50,000,000. New York Trust Co. and City Trust Co., Boston, transfer agents. Bankers Trust Co., New York, and State Street Trust Co., Boston, registrars. Shares are listed on the Boston stock exchange.

The Greene Cananea Copper Co. is a securities holding corporation solely controlling, through stock ownership, the Greene Consolidated Copper Co. and the Cananea Central Copper Co. The Greene Cananea exchanged its shares for the stock of the two subsidiary corporations on the basis of 1½ shares for each share of Greene Consolidated, and 1⅔ shares for each share of Cananea Central, this exchange calling for $50,000,000 of stock of the Greene Cananea to completely absorb the shares of the Greene Consolidated and Cananea Central. On March 17, 1908, the Greene Cananea owned 925,038 shares of the issued capital stock of 1,000,000 shares of the Greene Consolidated, and 522,272 shares of the issued capital stock of 600,000 shares of the Cananea Central. Exchange of stocks is still in progress, and it is expected that eventually the entire capital stock of both the subsidiary corporations will be acquired.

The Greene Cananea Copper Co. was said to have begun business with *$8,000,000 cash*, part of which was to be used for payment of old debts of the

reene Consolidated, part for the purchase of supplies and about $3,000,000 for new reduction plant and other improvements. Officers of the company were quoted, in the press, as stating that not one cent of promotion profits were taken by men interested in the company, and that the proposed plan provided $7,000,000 additional cash, and that the cash was safely in the hands of the treasurer. It was stated, in the press, as recently as October, 1907, that the company's treasury contained $7,000,000 in cash, and the same authority stated that the treasury contained between $6,000,000 and $7,000,000 at the time of suspension of operations, November, 1907. It was stated, in the press, Aug. 6, 1907, that the annual report, forthcoming in October, would show $8,000,000 cash in the treasury, with fuel, supplies and stocks valued at $3,000,000, with a total of cash and salable assets of $20,000,000. The company's first annual report, of date March 17, 1908, showed a cash balance on hand, Dec. 31, 1907, of $11,328.23, with total receipts of $125,000 borrowed from the Cananea Central Copper Co., and $12 received from sundry sources. It is quite obvious that the books of the Greene Cananea Copper Co. are so kept that the principal items of receipts and expenditures are distributed between the various subsidiary corporations. Inasmuch as the Greene Cananea is a securities holding corporation only, and its sole revenue is from dividends of subsidiary corporations, none of which are on the dividend list at present, it is evident that this system of bookkeeping is unavoidable, though most confusing to shareholders.

In the various articles descriptive of the Cananea Consolidated Copper Co., S. A., Cananea Central Copper Co. and Greene Consolidated Copper Co., the relations of these interlocking corporations are given in as much detail as possible, though much confusion has arisen through the disingenuous reports and statements of the Greene Consolidated Copper Co., which listed, among its assets, all the property of the Cananea Consolidated Copper Co., S. A. While the financial relations of the various corporations are explained in detail in the articles devoted to each, it has been thought best to consolidate the description of the respective properties under one head, as any other method would give merely fragmentary descriptions of what now, to all actual intents and purposes, constitutes a single property, and, inasmuch as the Greene Cananea Copper Co. is the controlling power, and operates all of the properties in question, and its shares are those that are held mainly by investors, only small minority interests remaining outstanding in the other corporations, it has been deemed advisable to give the description of the Cananea mines and works under this title.

The authentic history of the Cananea mines dates from A. D. 1568, but it is thought that the mines may have been opened by the Aztecs previous to the conquest.

There was much litigation over titles, but the lands were redenounced, 1902, and direct title taken from the Mexican government by the Cananea Consolidated Copper Co., S. A.

The mines are in the municipality of Ronquillo, and the principal administrative buildings are in that municipality, near the smelter. The company owns the townsite of La Cananea, on the mesa to the eastward of Ronquillo, and therein are located the best dwellings, hotels and public buildings. Franchises are held for electric light, water, ice, traction and telephone services.

Lands of the Greene Consolidated were 4,214 pertenencias of one hectare each, equivalent to 10,412 acres, the main mining tract having a boundary line of 32½ miles, and including about 40 old mines and prospects, located in the Cananea Mountains, in the free zone of northern Sonora, about 20 miles south of the Arizona border. The Greene Consolidated had mineral concessions for 184 square miles, in Sonora and Chihuahua, *expiring* May 7, 1906, only part

of which were renewed. Including the Cananea Central holdings, the Gr Cananea has about 37,000 acres of mineral lands and circa 350,000 a of surface rights. The Sierra Cananea is about 25 miles in length, and 6 t miles in width, with a northwest and southeast strike, divided into plainly marked and nearly equal sections by Puertecitos Pass, the prope of the Greene Cananea being in the southern half of the mountains on a eral belt apparently having a strike practically parallel with that of the ra

The Cananea Mountains show marked evidence of strong volcanic ac in the remote past. The Cananea mines are found in a succession of appr mately parallel outcrops of altered limestone, alternating with porphy dikes, the ore deposits, often of monstrous size, occurring in shear-zones tween the limestone and porphyry, and as replacements in the latter. The bodies are entirely distinct and vary greatly, affording practically all vari of oxidized and sulphide ore, with considerable native copper. Many of ore bodies are silicious, requiring concentration to eliminate the silica, w occurs as quartz and as aluminum silicate. None of the ore carries zin other refractory elements. There are large gossan outcrops, but appearan sometimes are deceptive, and much of what appears gossan at a dist proves, upon closer inspection, merely weathered conglomerate, showing dish-brown stains closely simulating the iron colors.

The mines of the Cananea Consolidated Copper Co., S. A., are div into 5 zones, known as the Cobre Grande, Veta Grande, Esperanza, Capote Puertecitos, each zone including a number of different mines, principal velopment being on the Capote, Veta Grande and Esperanza zones. Cananea Consolidated has 8 main shafts, with upwards of 40 miles of w ings, development, for 17 months ending 1907, having aggregated abou miles of workings, with 2,332′ of diamond drill borings. Extraction is m by 8 working tunnels, double-tracked and electric-lighted, having ele motors pulling 10-ton cars. The mines consume yearly, for timbering, a 40,000,000′ of pine and fir, mainly from Oregon, though a limited suppl secured from the Sierra Madre Mountains. Considerable ore is mined by slicing system, which is a modification of the caving plan. Some stopes been lost, through poor timbering, but the mine, as a whole, is not in shape, notwithstanding reports to the contrary. Ores are decreasing in co content with depth, but the sulphide ores show increased silver values in lower workings. The ore bodies lie rather deep, as a rule, hence are una able for open-cast workings, except in one instance. The Cananea has siderable reserves of ore of 4% or better in copper tenor, and is said to blocked out upwards of 3,000,000 tons of ore of about 3.5% average grade.

The Cobre Grande, which was the original mine of the Cananea Co dated, was worked in a crude way by the Pesqueira family for several erations, but now is a minor property. This group shows ore of concentr grade only, the mine having upwards of a mile of workings.

The Veta Grande has 2 enormous ore bodies, the Veta Grande p having a pitch of 36°, with an average width of 216′, average length of and known depth of 1,000′, containing about 7,000,000 tons of ore of me tenor, with some high grade ore. The Massey ore body, opened in 1904 been developed for 750′ in width and 1,200′ in length, and is of unk depth, some of the ore assaying up to 7% copper, with combined gold and s values of about $2 per ton. There also is a 150′ ore body on the hanging of 2 to 6% copper tenor, the silicious portions of which are used for conv linings. The Veta Grande ore is mainly soft chalcocite, carrying conside quantities of native copper and occasional massive chalcocite, associated a small amount of pyrite, gangue being talc and occasional quartz. Extra *is mainly* through Veta Grande tunnel No. 9, of 6,236′ length, which s

both the Veta Grande and Oversight mines, connecting also with the Capote tunnel. Owing to soft ground about 200' of this tunnel has been concreted. The Veta Grande is timbered with square sets, and depleted stopes are filled with waste. The ore is mined in 100' sections, leaving 100' slices unmined, and as the worked-out stopes are filled in, it will be possible to mine out the untouched portions. The Veta Grande ore bodies are overlaid by a heavy felsite capping, estimated at 830,000 cubic yards, and the former management gave consideration to the advisability of stripping the surface. Veta Grande shaft No. 5, of 3 compartments, has a 115-h. p. double hoist good for 1,000', operating 2 hoists in balance, and a 7-drill air-compressor, smithy, framing shop, etc.

The Oversight mine, which is practically a continuation of the Veta Grande, and is served by the Veta Grande tunnel No. 9, has a limited amount of ore ranging up to 25% copper, and has developed a new ore body of 2.5 to 3% average tenor.

The Capote zone, including a number of mines, is the principal property of the Cananea Consolidated, and has 4 main shafts, known as No. 2, 4, 6 and 8, and planned another 3-compartment shaft, circa 300' west of No. 2, which replaced No. 10, but the ground proved too soft to stand well. Extraction is mainly by tunnel, the main working level having a double-track tunnel connecting with shafts 2, 4, 5 and 7, at an extreme distance of 2,900'. On the 1,050' level the Capote shows a vein of about 75' width, carrying mainly chalcopyrite, with some chalcocite, assaying 4 to 20% copper. The Capote was on fire, 1907-1908, for about 12 months, but the fire was quenched by drowning, after the mine suspended operations. The main ore body of the Capote consists essentially of pyrite, coated with a thin film of chalcocite, occurring in thin crystalline grains, scattered quite uniformly through immense bodies of talc, the ore being highly silicious. No. 2 shaft has a 110-h. p. hoist and No. 4 has a double hoist good for 3,000' depth. The Capote equipment includes an air-compressor and a 50-kw. direct-connected generator furnishing light and power. No. 10 Capote shaft has a Prescott pump of 1,250,000 gallons daily capacity.

The Elisa mine, 1,500' south of No. 2 Capote, shows a vein of about 20' width, for a distance of 500', on the second level, said to average 4 to 6% copper, with somewhat higher grade ore below, ore being silicious chalcopyrite carrying good gold and silver values. The main shaft of the Elisa is 540' deep.

The Esperanza zone, but slightly developed, is known to carry good ore bodies, and probably will be developed through the Capote workings.

The Puertecitos zone, which is the westernmost, is about 4 miles northwest of the Elisa shaft, and has an ore body of immense size, with an outcrop up to 800' in width. The oxidized zone, which is comparatively shallow, shows considerable malachite, azurite and occasional cuprite and native copper, but the main ore bodies are chalcopyrite, with occasional bornite, in a lime-garnet-alumina gangue. The ore was said, formerly, to average about 3.5% copper and 3.5 oz. silver, but these figures probably are too high. The workings of the Puertecitos zone are known as the Ventura on the east, having a 700' shaft, the Juárez, 1,200', next west, and the Elenita, 900' west of the Juárez. Some rich ore has been exposed in grading for surface structures at the Elenita. The Puertecitos has enormous quantities of low grade ore, but is idle.

The Cananea Central properties, with several miles of workings, apparently have ore of somewhat higher average grade than the Cananea Consolidated, and were claimed, 1907, to have in sight 2,000,000 tons of ore of better than 5% average grade. Lands of the *Cananea Central* are 3,708 acres, com-

prising holdings of various subsidiary companies, including the Duluth anea-Duluth mine, Dos Naciones, American and Bonanza mines.

The Duluth mine has 2 shafts, with extensive openings on the 17 and 370′ levels, for circa 1,000′ length, showing a vein of 20′ to 150′ carrying ore ranging up to 15% copper and 25 oz. silver, with fair gold This mine is said to show, on the third level, ore averaging circa 4.5% 8 to 10 oz. silver and 40 cents to $2 gold per ton.

The American mine has 6 shafts, all shallow, showing some very ri and 2 additional shafts have been planned.

The Bonanza mine is said to have a proven ore body 1,000′ in and upwards of 100′ in width, with first grade ore assaying 15 to 32% and second grade ore said to assay 5 to 7% copper, 5 to 15 oz. silver gold per ton, but it is probable that the average of actual extraction w much below these figures.

The concentrator department includes a crushing plant, samplin 2 concentrators, machine shop, smithy and 2 warehouses. The crushing in a separate building has 8 ore bins of 20,000 tons storage capacity, to ore is delivered from Ingoldsby side-dumping cars. From these bins drawn onto a Robbins picking belt, 36″ wide and 68′ long, from which copper and chalcocite are hand picked. The ore then goes to a Man conveying belt, 30″ wide and 275′ long, of 200 tons hourly capacity, leads to grizzlies, screened fines going to storage bins and ore going 10x20″ crushers, which reduce the ore to 1½″ size, each crusher disch into a set of 16x36″ rolls, which crush to ¾″ size and discharge to be veyor, which takes the crushed ore to the storage bins of the mills.

There are two concentrators, No. 1, the old mill, of wood, having individual sections, covering 29,650 square feet. Concentrator No. 2, of in four 500-ton sections, terraced throughout, covers 33,240 feet, an circa $250,000. Foundations of new mill are concrete on rock base, pendent of wooden floors. A third concentrator seems needed, but the water supply is insufficient for another mill. The mills put about 3 into 1, and save about 75% of the assay values, ores being difficult centration, owing to the gangue being highly silicious and aluminous.

From the 3,000-ton storage bins in each mill ore is drawn by aut feed to 8 trommels having ⅝″ holes. The tailings from the bull j reground in rolls, and elevated to pass through 8 trommels with ⅜″ Tailings from the fine jigs are reground in ten 5′ Bryan mills, and Chilean mills, sized in classifiers and distributed to 43 Wilfley tables overflow from the spitzkasten below the Bryan mills goes to pulp, th and makes feed for 36 Frue vanners, while the bottom discharge fr spitzkasten goes to the classifiers for Wilfley tables. Equipment mills include eight ⅝″ screens, eight ⅜″ screens, eight 3/16″ screens, 2mm. screens, 16 elevators, 16 hydraulic classifiers, 72 jigs, ten 5′ Bryan two 6′ Chilean mills, 108 Wilfley tables, 144 Frue vanners, 16 shaking ta and 10 Cole drag belt conveyors.

Concentrates are conveyed by locomotives to bins, and loaded thenc narrow-gauge cars for the ore bedding plant. Tailings go to the coars tanks, where coarse sand is settled out, overflow going to slime tanks, fine slimes are settled, and the clear water pumped back for furthe There is a big dam for tailings. Owing to scant water supply, water the coarse jigs is sent to the jig floor and used on middlings, and water the middlings is used upon the sands, and thence back to the coars again. From the Wilfleys the water goes to thickeners, and from the t the water is recovered in settling tanks, the amount of water recover

this ingenious combination of economies being 87.5% so every gallon does duty eight times over.

The power plant at the crushers and mills includes a separate boiler-house with six 250-h. p. Stirling boilers, and an engine-house for each mill, the power plant for No. 1 mill including a 400-h. p. 16x36" Murray tandem compound engine and a 325-h. p. 12x24x30" Minneapolis cross-compound engine. Mill No. 2 has a 400-h. p. Allis-Chalmers 16x32x36" cross-compound engine and two 600-kw. electric generating sets.

The ore bedding plant has 3 beds, each 50x450' and of 9,000 tons capacity, where charges are thoroughly mixed by traveling belts, distributing ore, fluxes, etc. Thoroughly fluxed charges are taken from these beds to the feeding-bins of the smelter.

In 1907 the company gave serious consideration to the building of a new smelting plant, but eventually decided to rebuild the old smelter. The sites under consideration were on the Sonora river, some miles below the present works, and to the eastward of La Mesa, several miles east of the old plant. Tentative plans for the new smelter called for a $3,000,000 plant, to have three 54' blast-furnaces. These plans, however, were abandoned, in favor of rebuilding the old smelter.

The cupola building is 33x296' in size, of steel frame with iron sides, with 4,000-ton ore-bins and 3,000-ton coke bins. There are 75-ton steel charging bins in front of each furnace, for feeding mixed charges, and material is handled by gravity. The charging bins have automatic gates, and dump charges direct into the furnaces, one man caring for two furnaces. The old plant had 8 furnaces, of 7 different types, all of which were remodeled or scrapped, and replaced by 8 practically uniform furnaces, of sizes 48x210" and 42x228" at the tuyeres, giving an average capacity of 400 tons for each furnace, with an aggregate capacity of 3,200 tons for the smelter. Seven small settlers formerly used have been replaced by 4 large clay-lined settlers, each serving 2 furnaces. Settlers skim continuously into self-dumping slag-cars, drawn by two 35-h. p. and two 40-h. p. electric locomotives, traversing a rebuilt slag-line. Over each furnace is a 20x20x20' steel dust-chamber, planned to collect flue-dust and return same to the smelting zone by gravity, which were installed by the old management, but failed to work according to theory. Leaving these primary individual dust-chambers, furnace gases go to a 10x13x400' dust-flue leading to a 250x250' brick dust-chamber. Smoke and gases are discharged from the main dust-chamber through a self-supporting steel stack 10' 6" in diameter and 190' feet high. The blast-furnace building has 2 Mc-Dougal calciners.

The converter building, 60x396', of steel frame with iron sides and roof, has 3 electric cranes with double auxiliary hoists of 40' and 50' span, each with a clear hoist of 40' to the main blocks. Three old stands with 24" cylinders, operated hydraulically under a pressure of 200 lbs. per square inch, have been reconstructed, and there are two new stands, operated electrically. There formerly were 22 shells of 132x156" size, which have been replaced by eight 96x138" shells of barrel type, and other shells of the same size will be added. The converters blow off into moveable hoods leading to primary and secondary dust-chambers. A railroad track runs under each stand, and the casting-cars are fitted with six 300-lb. ingot moulds each, there being 24 cars and 250 moulds. Ingots are carried in cars to the bullion floor, where the pigs are chipped, stippled by electric drills, weighed and loaded. The converter-slags are taken in ladles, by crane, to the forehearths, saving resmelting.

The lining department, at the eastern end of the converter building, has 600-ton silica bins, with material handled by gravity, one 10x20" Blake crusher, two 16x36" Argall rolls, one 8' automatic *mixing-pan*, conveyors and elevators,

power being supplied by a 125-h. p. electric motor. Tamping is by pne rammers. Low grade silicious ores are used for linings, instead of silica.

A 350-ton oil-burning reverberatory furnace was built, 1905, with sions of 27x120′ and hearth of 20x100′, being the second largest in the The result was not very satisfactory, and the furnace has been rebuilt 19x100′ and treats flue-dust, waste gases firing an adjoining boiler.

Much of the ore smelted being pulverulent, an excessive quantity dust is produced, which is briquetted before resmelting. The briq plant includes a 225-ton Mould plunger press and a 100-ton White briquettes being sent by belt-conveyors to the charging-floor of the s A considerable number of men were employed formerly on hand-briqu

The central power plant, near the smelter, has a 65x245′ engine-ho steel, with iron sides and roof. The plant includes a 325-h. p. 14x26x36′ Chalmers tandem compound condensing engine, two 300-kw. McIntosh e one 200-kw. Union Iron Works engine and three 100-kw. Union Iron engines, furnishing a 250-volt current for various uses around the also lighting the mine buildings and the towns of La Cananea an quillo. Blast is furnished by one 750-h. p. Rand air-compressor, two 5 Allis-Chalmers air-compressors, one 225-h. p. Nordberg air-compresso 250-h. p. Murray tandem compound blowing engine, two 250-h. p. blowing engines, one 250-h. p. Allis Corliss tandem blowing engine, one 1 Murray blowing engine, one 100-h. p. Allis blowing engine, one 100-h. p. blowing engine, three No. 10 Connersville blowers and three No. 8 C ville blowers, the blowers having an aggregate capacity of 30,000 cub of free air per minute. The 42″ crooked blast-pipes formerly in us been replaced by two 96″ straight blast-pipes.

The boiler-house of the central power plant is 46x216′ in size, o with iron sides and roof, and has 3,500-ton coal bunkers. There boilers, of 3,000-h. p. aggregate capacity, with a 12″ steam main from room to engine-house. Coal is fed by gravity from bins, and pulverizer installed, 1907, but petroleum has been substituted for coal, as fuel f eral purposes, at an estimated saving of about 25%, the Mexican gove having consented, as an aid to the company, to remove the duty on pet Fuel is mainly Texas oil, bought under a contract calling for 1,500,000 in 2 years. There are three 100,000-gallon oil storage tanks, with 6 lines for loading from tank-cars, and oil is drawn from the tanks b lines leading to the boiler-room.

Shops at the mine and works include a steel machine-shop, well eq and having a foundry with a 2-ton casting cupola. The carpenter-sh planing mill have complete equipment for making sashes and doors. smithies are numerous and fairly equipped. There also are large ware for mine, mill and smelter supplies.

Potable water is piped from Sawmill Cañon, and water for the trators, boilers and other uses, is secured from a pumping plant at Agua, on the headwaters of the Sonora river, 9¾ miles from the mine pumps have capacity to force 1,750,000 gallons daily through a 10″ stee line, against a head of 967′, to a reservoir on the hills above Ronquillo, water is delivered to the mine, reduction plant and towns, under a s tial working pressure. The water system of the company has about 2 of mains, ranging in size from 2″ to 10″, and owing to the cost of s water, it is clarified and re-used, wherever possible. The water storage at the smelter have 596,000 gallons capacity, with 9,300′ of mains and of 2½″ fire-hose.

The company's private railroad, of 36″ gauge, laid with 35-lb. and

ails, has about 30 miles of line, including branches, spurs and side- and an extension of 4.14 kilometers has been built from the smelter American and Duluth-Cananea mines. Equipment includes 12 locomo- d a number of 25-ton cars. The line has been double-tracked between centrator spur and the Capote mine. Rail connection with the outside over the Ferrocaril Cananea, Rio Yaqui y Pacifico, with which the has a 25-year freight contract, made circa 1902, assuring favorable ates. The property has about 30 miles of wagon road, with maximum f 7%, and about 35 miles of trails.

company's brick-yard has a daily capacity of 35,000 brick. There wmills, with a combined daily capacity of 14,000', sawing timber cut company's lands.

mercantile branch of the company does a very large business, having rick store, carrying an enormous stock, and a branch store at Chiva- h warehouses having direct rail connection. The retail mercantile amounts to nearly 4,000,000 pesos yearly, when full forces are em-

Banco de Cananea, organized January, 1902, with a capital of 200,000 nacio Macmanus, cashier, is owned and operated by the Greene Con- and does a large and profitable business.

company owns 5 office buildings, 11 dwellings for foremen, boarding ith capacity to care for 900 men, 3 lodging houses of 10 rooms each, rooms and 1 of 42 rooms, all of brick, a restaurant, bakery, meat- nd about 200 cabins for Mexican miners. A well-appointed club- maintained for the American employes.

company maintains a 40x100' two-story brick hospital, having a de- teben and beds for 59 patients, also a 6-ward emergency hospital at , with a full force of physicians, surgeons and nurses.

company maintains a telephone system having about 200 miles of circa 150 'phones, also an independent telephone system used for ig on the narrow-gauge railroad. A scavenger service is maintained unicipality of Ronquillo.

company owns upwards of 400 horses, mules and burros and has a al for their care.

ncession for a power plant on the Yaqui river is held from the government, and the installation of a large hydro-electric plant was sideration by the former management.

al forces are about 5,000 men, including several hundred American orkmen and a few Chinese, but about 85% of the labor is native. of departments and shift-bosses are American, but the miners and are exclusively Mexicans. The suspension of operations, 1907, gave any a chance to eliminate some very undesirable native labor, which d serious rioting in 1906. Only workmen of the better class were d when operations was resumed. Owing to the proximity of the to the border, there is an unduly large proportion of undesirables ions in the district—Mexicans who stay near the line, in order to s in a hurry, if necessary, and Americans who already have crossed for good and sufficient reasons.

new board has ignored the contract of the former management to Consolidated with the American Metal Co., Ltd., and is now selling through the United Metals Selling Co. Had the company to sell its copper under the old contract it would not have had last weeks of 1907, about 12,000,000 lbs. of copper at 12 to 13 for export, which could have been sold, in the first half of 25 cents per pound.

The dissatisfied shareholders of the Greene Consolidated have appoin a protective committee, and there is some possibility of litigation, though is difficult to see what action the shareholders of the Greene Consolidated take against the Greene Cananea, as their only recourse would seem to against the former officials of the Greene Consolidated.

The mine was closed down, circa November, 1907, the letter of Ricketts to Gov. Torres, of Sonora, explaining the suspension, stating that company had been unable to sell any copper for 8 months, and, at that ti owing to the panic, could neither sell nor borrow. If the company was una to sell for 8 months preceding 1907, it was solely because of its affiliati with the Amalgamated Copper Co., as other producers had no difficulty, vious to June or July, 1907, in selling at nearly twice the price that current in November. Operations were resumed on a small scale, early 1908, when repairing and rebuilding was begun, and the smelter was bl in July 11, 1908, with 2 furnaces, 2 additional furnaces being blown in J 23, and the property is gradually getting back to a normal basis of product

Production of the Cananea has shown steadily decreasing average values. Owing to lavish use of the high grade ores, the average extract declined from 5.73% copper in 1903 to 4.45% in 1904, 3.65% in 1905 2.95% in 1906, while the average for 1907 was 2.329%. Production is ab 25% smelting ore and 75% concentrating ore. In 1906 more than half of production came from the Capote and Oversight mines, the Veta Grande be the next largest producer.

For fiscal years ending July 31, production of fine copper has been follows: 64,211,895 lbs. in 1905; 55,943,478 lbs. in 1906, and circa 43,000 lbs. in 1907. For the calendar year 1907 production was circa 34,000,000 For 17 months ending Dec. 31, 1907, production was 1,347,054 wet tons ore, yielding 58,180,856 lbs. fine copper, 766,422 oz. silver and 6,100 oz. g giving a recovery of 46.58 lbs. fine copper per ton, or 2.329%, with gold silver values of 1.213 cents per pound of fine copper, or 56.5 cents per of ore.

Production July, 1908, was circa 1,000,000 lbs. fine copper, and in Sept ber, 1908, production was at the rate of about 3,000,000 lbs. monthly, trea circa 2,200 tons of ore daily. The cost of copper produced under the management steadily increased, and costs, 1907, under the new manageme were abnormally high, owing to a variety of unavoidable factors. The p tical rebuilding of the plant and reconstruction of methods throughout h cut costs greatly, and it was stated, late 1908, that the labor cost was only cents per ton for smelting, the smelter having been increased 50% in capac with a 50% decrease in forces required. Dr. Ricketts hopes to produce cop at a cost of 10 cents per pound, for all charges, as against former costs 13 to 15 cents per pound. It was stated, unofficially, August, 1908, that c were only 7.5 cents per pound, at the mine, or about 9 cents per pound finished copper at the seaboard, but probably these estimates were unduly l as 10 cents is about as cheaply as the Cananea mines can be expected produce the metal. The capacity of the mine and works is about 5,000, lbs. monthly, or 60,000,000 lbs. per year, which should be increased, in comparatively short time, to 75,000,000 lbs., and eventually to 100,000, lbs., or even more, as the property is of vast size and tremendous possibiliti

Col. Wm. C. Greene, who developed the Cananea mines from petty workings to one of the greatest copper producers of the world, was too am tious, and had too many irons in the fire, his operations, in addition to dire ing the Cananea mines, including the management of the Greene Gold-Sil Co., Greene Gold Co., a railroad company, some of the largest ranches *Mexico*, extensive timber tracts and lumber operations, and a variety of oth

work, entirely too much for one man to direct properly, and requiring infinitely more money than Col. Greene could command. Because of his marked loyalty to friends, and many other fine characteristics, there is much sympathy for Col. Greene, but the shareholders of his companies also are deserving of sympathy, for the bog into which they were led. The present company has an exceedingly strong and capable management, those at the head of the corporation, Messrs. Cole and Ryan, being among the best mining executives to be found anywhere, while Dr. Ricketts has no superior as a metallurgist, and the work that he has done at the Cananea mines shows him to be also a manager of exceptional executive ability. Much remains to be done before the Cananea mines can be considered on a thoroughly satisfactory basis, but so much has been accomplished already that there seems no reason to question the ability of the management to perform the balance of the work.

GREENE CONSOLIDATED COPPER CO. **MEXICO.**

Office: 42 Broadway, New York, N. Y. Mine office: La Cananea, Arizpe, Sonora, Mex. W. D. Thornton, president; C. D. Fraser, vice-president; J. W. Allen, secretary and treasurer; preceding officers, P. L. Foster, Alfred Exner, E. C. Rice and S. E. Searle, directors.

Organized Sept. 16, 1899, under the laws of West Virginia, and capitalization increased, 1904 and 1906, to $10,000,000, shares $10 par. Has paid total dividends of $7,450,580 to end of 1908. Annual meeting, second Tuesday in March.

The bi-monthly dividends of 1906 turned out to run only 5 to the year, and even fewer in 1907, dividend No. 21 declared, February, 1907, having been the only one for the year.

The only asset of the Greene Consolidated Copper Co. is the total stock issue of the Cananea Consolidated Copper Co., S. A., and the mines and smelters formerly described under title of the Greene Consolidated are listed, in this volume, under title of the Greene Cananea Copper Co. The Cananea Consolidated Copper Co. is controlled by the Greene Cananea Copper Co., through the ownership, October, 1907, of 923,698 shares. At the annual meeting, October, 1907, there remained 936 individual shareholders in the Greene Consolidated Copper Co. A shareholders' protective committee was organized, circa June, 1908, with Samuel Untermeyer, Louis A. Newkirk and W. A. McDonald as counsel.

The annual meeting that should have been held October, 1907, was postponed until March 10, 1908, at the request of the Greene Cananea Copper Co., the owner of about 93% of the total stock issue. Fiscal year was then changed from former ending of July 31 to the calendar year.

None of the annual reports of the Greene Consolidated to shareholders were fair, as the statements juggled the holdings of the Cananea Consolidated and Greene Consolidated companies in a most bewildering manner. Until October, 1907, the preceding annual reports of the Greene Consolidated had included accounts of both the Greene Consolidated and the Cananea Consolidated, without any explanation of the differences. All inquiries by shareholders were headed off, at the annual meeting, Oct. 12, 1907, as every question of importance at the meeting was ruled to belong properly to the Cananea Consolidated Copper Co., which owns all of the real property of the Greene Consolidated, or else to the Greene Cananea Copper Co., which owns upwards of 93% of the stock of the Greene Consolidated Copper Co., and neither of these corporations being present, the shareholders who wanted to know were left inquiring.

The Greene Consolidated Copper Co. was supposed to own a 51% stock interest in the Sierra Madre Land & Lumber Co., but it transpired that this was a myth, as the *stock always was owned by* the Cananea Consolidated

Copper Co., S. A.—or at least that is what the shareholders are told
On June 17, 1907, the company was said to have secured control, some
previously, of 51% of the Sierra Madre stock, for $1,250,000, and to hav
posed of the same, previous to that date, to Col. Wm. C. Greene and
ciates, for a consideration not then stated, but afterwards said to have
about $2,000,000, part in cash, with the remainder to be paid at inte
Apparently practically the entire payment was in the form of notes, an
Greene Consolidated apparently was obliged to pay 3 notes, aggreg
$450,000, in order to protect its interests, these notes having been giv
Col. Greene for advances made by the Greene Consolidated, when he w
the head of the latter company, in addition to a cash payment, said to
been $200,000. The Sierra Madre defaulted the interest on its bonds,
1, 1907, and is practically bankrupt. Apparently the notes given in pa
for the 51% of Sierra Madre stock sold for $2,000,000, which notes a
default, are secured by 75% of the lumber company's stock, which appa
is owned again by the Greene Consolidated, owing to default in payment
the relations of the Cananea Consolidated, Greene Consolidated and G
Cananea are so intricate and obscure that nobody but the principals ca
exactly who is who, what is what, or which is which.

The Greene Consolidated issued a circular, July 17, 1906, stating
stockholders of the Cananea Central Copper Co. would take over, an
for, in cash, to the treasury of the Greene Consolidated Copper Co
200,000 shares of Cananea Central stock held by the Greene Consolidated
per Co., but it transpired later that this circular was untrue, though
officially, as the Greene Consolidated never owned the 200,000 shares of
anea Central, this stock, which was fully paid and non-assessable, belo
to the Cananea Consolidated Copper Co., S. A. This is a sample o
"square deal" given its shareholders by the old management of the G
Consolidated.

The company's annual report, for year ending 1907, gave iten
$2,000,000 received from the sale of 200,000 shares of Cananea Centra
$1,350,000 received from the sale of 76,500 shares of Sierra Madre La
Lumber Co. stock. It was asserted, in the press, February, 1907, that on
15, 1907, the sum of $4,000,000 was transferred to the treasury of the G
Consolidated Copper Co., in payment at par for 200,000 shares of the Ca
Central.

The statement given at the company's annual meeting, October, 19
of date July 31 preceding, reported a surplus of $18,678,119, was altog
misleading, as the actual surplus, by the company's own figures, could n
figured as more than $1,575,222, even by including an indefinite amou
metal on hand, and practically there was no surplus whatever, as the
pany never, from its birth until its practical reorganization, had en
money to operate to advantage, and was chronically hard up, even when
ing dividends.

On July 31, 1907, according to the statement of Treasurer Fraser
Greene Consolidated had quick assets of about $7,000,000, but Mr. Fraser
dently forgot himself, as these assets belonged to the Cananea Consolid
This was another sample of the "square deal" given its shareholders b
old management of the Greene Consolidated Copper Co.

Apparently the actual "profits" of the Greene Consolidated fo
months, ending Dec. 31, 1907, were $3,220,247, including income, from va
stock and land sales, of $3,352,500, showing, by an honest accounting, an a
loss of $132,253, made in 17 months, during the most prosperous period
the copper market has known for many years. These figures show wh
Greene Consolidated was reorganized.

On Dec. 31, 1907, the company reported a balance of assets over liabilities of $5,961,059. It all lies in the bookkeeping, and a clever accountant can "prove" anything desired, by going over the figures of the Greene Consolidated Copper Co. As a matter of fact, the company's accounts were so badly kept, apparently partly through ignorance, and partly through intent to deceive, that all figures given out were highly misleading. The company never produced copper so cheaply as claimed, and it is doubtful whether the old management ever knew just what the copper was costing, or just where the company was drifting.

The Greene Consolidated Copper Co. was practically wiped out, Dec. 23, 1906, by the organization of the Greene Cananea Copper Co. The company was in such shape financially, at the height of a remarkable boom in the metal market, that is was about to collapse. Messrs. Thos. F. Cole and John D. Ryan, strong men in the copper industry, were called in to save the company from bankruptcy. They drove a hard bargain with the Greene Consolidated, as was their right, of course, and in forming the Greene Cananea Copper Co., put in their own holdings, which are of much less value than those of the Greene Consolidated, at a very high price. The reason for this was found in the desperate financial condition of the Greene Consolidated, which was practically bankrupt, although the owner of a magnificent property, while the Cole and Ryan property in the merger, though of much less value physically, was backed by strong interests, able to pull the property through. The shareholders of the Greene Consolidated have good reason for bitter feelings, but their grievances lie against the old management, rather than against Messrs. Cole and Ryan, who were called in as medical experts, when the patient was at his last gasp, and saved his life, but charged a tremendous fee for so doing. That the fee was very large cannot be controverted, but the shareholders of the Greene Consolidated are better off, after paying the fee, not directly in cash, but through dilution of their holdings, than they could have been had the property been allowed to go by the board, when the salvage would have been trifling, and very possibly nil.

The property formerly controlled by the Greene Consolidated Copper Co. was fully described in Vol. VII, and is described, in connection with adjoining property, under title of Greene Cananea Copper Co., in this volume. The present status of the Greene Consolidated is merely that of a footbridge between the Cananea Consolidated, which holds direct title to all the property, and the Greene Cananea Copper Co., which controls the property through ownership of shares. The shareholders who insist on occupying the bridge are apt to be jostled. They had better walk ashore. They have been defrauded, but the people guilty of defrauding them can make no restitution, and those who are financially capable of making restitution are not responsible, legally or morally, for the loss.

GREENE GOLD-SILVER CO. **MEXICO.**

Office: 1210-24 Broad St., New York, N. Y. Mine office: Concheño, Bayón, Chihuahua, Mex. Col. Wm. C. Greene, president; Mark L. Sperry, vice president; Richard A. Jones, secretary; E. J. Gates, treasurer; Clarence C. Chase, general manager; W. E. Pomeroy, superintendent.

Organized Nov. 10, 1902, under laws of West Virginia, with capitalization $15,000,000, increased March, 1906, to $25,000,000, shares $10 par, in $3,000,000 preferred cumulative 8% stock and $22,000,000 common shares. Trust Company of America, New York, transfer agent. New York Trust Co., registrar.

Dividends on the preferred 8% stock were supposed to be payable annually, but the first dividend, of 40 cents per share, declared September, 1906, was not paid until February, 1907, while the third semi-annual dividend, due September, 1907, was *passed. The company offered* 100,000 shares of new

stock February, 1907, which issue was underwritten and placed, a
offered 100,000 shares April, 1907, of which only about 10,000 sh
taken. Col. Greene gave stock of the par value of nearly $8,000,000,
1907, to relieve the company's treasury, but there being no marke
stock, the gift was of little or no value. The company's balance
July 31, 1907, showed current assets of $2,858,641, and current liab
$3,035,338, but, as a matter of fact, the assets were practically all
tious, there being about $82 cash on hand, with an enormous flo
debtedness.

The company secured an extensive concession, Apr. 6, 1907, fo
velopment of water power, telephone lines, milling plants, etc., in the
of Bravos, Guerrero, Rayón and Galeana, in the state of Chihuahu
concessions would be valuable, if the company were in a position to
vantage of them. The company previously secured concessions for
the water power of the Aros and Yaqui rivers, and for various public

In 1906 the company claimed to own, in fee, 340,000 acres of
cluding a large number of mines, with a government concession
mines in an area of upwards of 4,000 square miles, in the states of C
and Sonora, Mexico. The company claimed, 1907, to own 114 mines
parently really owned only 4, out of the entire number, balance b
under option and bond. These 114 properties were claimed to have
upwards of $120,000,000 in ore values, and had 12 different reduction
as many different properties.

The most important mine of the company, and, in fact, the o
that really can be called such, is the Concheño, area 398 hectares
circa 1907, for $1,250,000, of Corrigan, McKinney & Co. Unfortuna
property was bought on a margin, like most of the others, and th
owed the vendors, said to be nearly $1,000,000, probably will bring
loss of the property. The plant at Concheño includes a 60-stamp mi
tons daily capacity, and a 500-ton slime plant was begun, late 1907.
tion of the Concheño, September, 1907, was said to have been v
$52,000. Holdings in the Jesús Maria district, Ocampo, Chihuahua,
the Santa Juliana, Balvanera, Guadalupe, Rincón and Ronquillo grou
Santa Juliana is claimed to have produced, according to government
upwards of $100,000,000, from a vein up to 15′ in width, opened to 9
This mine was reopened by a double track drainage tunnel, but a
did not prove a success.

The Balvanera group, area 61 hectares, adjoining the Santa Jul
a 40-ton mill and concentrator, and is claimed to have produced up
$3,000,000 worth of ore, and to have numerous buildings and variou
improvements. This group was said to include 44,000 acres of pine
timber lands.

The Guaynopita group, area 113 hectares, in Guaynopita Cai
huahua, near the Sonora line, includes properties said to have been w
the Aztecs before the conquest of Mexico, the mines showing ores
well in gold, silver and copper. It was planned, at one time, to
500-ton smelter on this property.

The Mulatos group at Mulatos, Sahuaripa, Sonora, Mexico, is o
El Rey del Oro Mining Co., which is controlled, through stock owne
the Greene Gold-Silver Co. This group includes 6,400 acres of mine
and miscellaneous holdings giving a total of 24,700 acres. The mine
to have produced upwards of $18,000,000, mainly in gold, from aras
an old 60-ton mill on the property. The veins are claimed to ran
500′ in width, which seems doubtful, and the company planned the ins
of a 2,500-ton mill, which was a chimerical project.

The Matulera group, at Ocampo, Chihuahua, is said to have a 15′ vein, ying values mainly in gold, and the company was said to have begun a ton cyanide plant.

Miscellaneous properties are many in number, all apparently held on ons, or otherwise than by outright ownership, these including the following ps: Santa Brigida, in Chihuahua, area 95 hectares; Cerro Boluda group, hihuahua, area 152 hectares; Pinos Altos group, in Chihuahua, area 58 ares; El Trigo group, in Sonora, area 16 hectares; La Trinidad group, in ra, area 130 hectares; El Colón mine, 32 hectares; San Ramón group, in uahua, area 23 hectares; Mina Grande group, in Sonora, area 25 hectares; a Santa mine, area 46 hectares; La Lamosa group, area 44 hectares; n group, in Chihuahua, area 70 hectares; El Refugio group, in Chihuahua, 87 hectares; Santa Eduviges group, in Chihuahua, area 55 hectares.

The lands of the company, or rather the lands once supposed to be held the company, were estimated, by Col. Greene, to carry 3,500,000,000′ of ding timber, valued at $10 per thousand. The company also claimed to coal properties at Pilares, and iron mines at Cedros. The coal mines estimated to carry 200,000,000 tons of coal, and the iron mines were sup- d to be comparable to the Mesaba iron range of Minnesota.

The Guaymas smelter, supposed to be owned by the Greene Gold-Silver actually is owned by the Mexican-American Smelting Co.

The Federal smelter, at El Paso, located on a 40-acre tract, is said to have n bought by the Greene Gold-Silver Co. for $54,500, subject to a vendor's of $42,000, having been bought "on a shoestring," like all the other perties of the company.

In July, 1907, the company employed about 1,600 men at its various mines d works, and in August, 1907, reached a daily productive capacity of nearly tons, but late in that month suspended operations, having reached the end its resources. President Díaz, of Mexico, who has been a consistent friend Col. Greene, is said to have loaned $250,000, personally, to help the com- ny along, but this was merely a drop in the bucket, and complete collapse s inevitable, by reason of the utterly fallacious plan of operations fol- wed. It is difficult to understand how Col. Greene, a man of undoubted bility in many fields, should have allowed his mania for buying mines to ve mastered him so completely as to have conducted the company's affairs ong such insane lines as were followed. Nothing was bought outright, if could be secured on a part payment, and, in consequence, the company, at e first financial pinch, fell to pieces like a house of cards. In fact, it is oubtful if anyone living, except Col. Greene himself, and possibly not even he, nows exactly what the company owns. It is safe to infer, however, that the mpany holds direct title to very little.

Shortly before the collapse, a stockholder's committee, including 2 direc- rs, endeavored to raise $25,000, through voluntary assessments, to make an amination of the company's property and business, but secured only $10,000, hich was refunded. The directors are making enough noise at present, but e time for them to have spoken was before the smash. Had they taken me real part in managing the company's affairs, instead of permitting Col. reene to be the entire direction, the company might not have found itself s present lamentable situation.

The Greene Gold-Silver Co. holds title to its properties through a Mexican corporation, and supposedly controls a number of subsidiary corporations as well. Stock in the Mexican company is said to have been hypothecated, hich, if true, leaves the American company without other assets than its fice furniture. The property is said to be in danger of being sold at auc- ion, piecemeal, to satisfy loans to Mexican bankers. Gov. Enrique Creel, of

Chihuahua, a thoroughly capable and trustworthy man, is acting a servator. The Greene Gold-Silver Co. was a one-man enterprise, and t man broke down. The company bought entirely too many properties wasted its funds on further purchases, instead of securing those alread under partial payments. Col. Greene has not profited personally, and to have broken down completely, apparently from nervous prostratio the responsibility for the complete collapse of the company rests solely him. The only possible chance for salvage lies in the reorganization company, in which case the old shareholders will be nearly or quite out, but small as may be the salvage, there will be none without a reorganization, if capital can be induced to go into the enterprise terms.

GREEN HOPE MINING & MILLING CO. WYO

Dead. Formerly at Guernsey, Laramie Co., Wyo. Described Vol. V

GREENHORN COPPER MINING CO. COLO

Mine office: Cañon City, Frémont Co., Colo. Mrs. Wm. E. J administratrix, Metropole Hotel, Denver, Colo., principal shareholder, an tically manager. Lands, 12 miles from Cañon City, show low-grade ores, slightly developed. Idle and apparently moribund.

GREENLEAF MINE. MON

Owned by Boston & Montana Consolidated Copper & Silver Mining

GREEN MONSTER MINE. NE

Office: care of Mrs. Phœbe Hearst, owner, San Francisco, Cal. returned unclaimed from former mine office, Sandy, Lincoln Co., Nev. is opened by a 325′ two-compartment vertical shaft, showing carbona sulphide ores, latter including argentiferous galena and chalcopyrite. has been claimed to show about 5,000 tons of $40 ore. Idle some years.

GREEN MOUNTAIN COPPER CO. CALIFO

Mine office: Raymond, Madera Co., Cal. John V. Bohn, superint Is controlled, through stock ownership, by American Smelters Securiti Has steam power. Presumably idle.

GREEN MOUNTAIN COPPER CO. NEW ME

Dead. Formerly at Rinconada, Rio Arriba Co., N. M. Fully de Vol. VII.

GREEN MOUNTAIN COPPER MINING CO. WYO

Dead. Property sold, circa 1904, to Saginaw Valley Copper Mini Formerly at Encampment, Carbon Co., Wyo.

GREEN MOUNTAIN MINE. MON

Owned by Anaconda Copper Mining Co.

GREEN MOUNTAIN MINING & MILLING CO. COLO

Office: 519 Frick Bldg., Pittsburg, Pa. Mine office: Silverton, Sa Co., Colo. Wm. P. De Armit, president and receiver; S. J. Crawford, tary; E. W. Walter, general manager. Organized under laws of Co with capitalization $3,000,000. Lands, 19 claims, area circa 200 a Cunningham Gulch, 7 miles from Silverton, opened by tunnels of 60 800′, with about 4,000′ of workings. Ores are auriferous and argent iron-copper-lead sulphides, with quartz gangue, averaging about $12 p in value. Has steam power and 12-drill Rand air-compressor. Has a concentrator, connected with the mine by a 4,000′ aerial tram. We receiver's hands November, 1907.

GREENWATER ARCTURUS COPPER MINING CO. CALIFO

Office: care of Hon. T. L. Oddie, Tonopah, Nev. Mine office: water, Inyo Co., Cal. C. M. Oddie, vice-president; H. H. Cookston, se *and treasurer;* preceding officers, F. A. Keith and W. D. Blackmore, di

ed, 1906, with capitalization $3,000,000. Lands, 12 claims, 3 frac- in the Willow Creek section south of the Greenwater district. Idle.

WATER BIMETALLIC COPPER MINING CO. CALIFORNIA.

e: care of E. C. Hughes, president, San Francisco, Cal. Mine office: ter, Inyo Co., Cal. Sig. Weil, vice-president; A. K. Durbro, secretary; g, treasurer; preceding officers, Marius Duvall, W. D. Tobey and W. al, directors. Organized, 1906, under laws of Arizona, with capitaliza- 000,000. Lands, 6 claims, adjoining the Furnace Creek Copper Co., a gossan up to 40′ wide, giving assays of 3.6 to 37.9% copper. Idle.

WATER BLACK JACK COPPER MINING CO. CALIFORNIA.

e: care of Dr. T. E. Enloe, secretary, Goldfield, Nev. Mine office: ter, Inyo Co., Cal. H. T. Bragdon, president; N. H. Truett, vice- t; J. R. Dortch, treasurer; preceding officers and H. F. Bartine, direc- nds, 4 claims, near the Greenwater-Death Valley Mining & Smelting to show argentiferous lead ore and copper ore assaying up to 20% oz. silver and $3.25 gold per ton. Idle.

WATER BLACK OXIDE COPPER MINING CO. CALIFORNIA.

e: 75 Sutter St., San Francisco, Cal. Mine office: Greenwater, , Cal. Jas. Gleason, president; J. C. McBride, secretary; preceding T. C. Risch and H. P. Mason, directors; Geo. Jones, superintendent. claims, near the Furnace Creek Copper Co. Idle.

WATER & BOSTON COPPER CO. CALIFORNIA.

office: Greenwater, Inyo Co., Cal. Apparently merely a stock-job- rprise. Idle.

WATER CALIFORNIA COPPER CO. CALIFORNIA.

e: care of Harry W. Woods, Colorado Springs, Colo. Mine office: er, Inyo Co., Cal. F. M. Woods, president; L. R. Myers, vice-presi- S. Buck, secretary and treasurer. Idle.

WATER-CALUMET COPPER CO. CALIFORNIA.

e: 8 Butler Bldg., Tonopah, Nev. Mine office: Greenwater, Inyo Co., L. Smith, president; R. Chester Turner, vice-president; H. W. Clarke, ; R. C. Moore, treasurer; preceding officers, Jas. N. Mayhew, Zeb. and W. Brown, directors. Organized Aug. 27, 1906, under laws of with capitalization $1,500,000, shares $1 par. Lands, 21 claims, area acres, near the Furnace Creek Extension Copper Co., showing a to 200′ in claimed width, giving surface ores assaying up to 16.7% lightly developed by tunnel. Idle, but plans driving a 500′ crosscut 1909.

WATER CENTRAL COPPER CO. CALIFORNIA.

, 905 Calvert Bldg., Baltimore, Md. Mine office: Greenwater, Inyo Oscar A. Turner, president; Hon. Buchanan Schley, vice-president; E. Milliken, secretary; Henry B. Gilpin, treasurer; Henry G. Merry, manager. Lands, on Sheep Creek, show a ledge nearly 100′ wide, a little carbonate copper ore.

WATER CONSOLIDATED MINING CO. CALIFORNIA.

e: 131 East 53d St., Los Angeles, Cal. Mine office: Greenwater, Cal. Way C. West, president and treasurer; D. D. Bickford, vice- ; B. X. Dawson, secretary. Organized, 1906, under laws of Arizona, italization $3,000,000, shares $1 par. Lands, 10 claims, area 200 pposedly located somewhere in the Greenwater district, on which no ent has been secured, also 4 claims at Brightwood, San Bernardino alifornia, presumably undeveloped also. Formerly held 12 claims at n Bernardino county, which were transferred to the Arcalvada Min- lling Co. Does flamboyant advertising, but apparently no work. Is with suspicion.

GREENWATER COPPER CO. CALIF

Office: care of L. G. Newby, secretary and treasurer, Pasadena, Cal office: Greenwater, Inyo Co., Cal. Z. H. Lowman, president; J. Q. vice-president and superintendent; L. G. Newby, secretary and tr Organized circa November, 1906, under laws of Arizona, with capita $1,000,000. Lands, 41 claims, in 7 groups, principal group, known as th Bird, showing ores giving assays of 3 to 12% copper. Idle.

GREENWATER COPPER HELMET CO. CALIF

Mine office: Greenwater, Inyo Co., Cal. Idle.

GREENWATER COPPER MINES & SMELTER CO. CALIF

Office: care of Donald B. Gillis, manager, Tonopah, Nev. Mine Greenwater, Inyo Co., Cal. Chas. R. Miller, president; M. R. War president; preceding officers, J. W. Brock, Chas. M. Schwab, W. H. I L. H. Dessar, Malcolm McDonald, J. E. Brown and Frank Keith, d Organized Dec. 12, 1906, under laws of Delaware, with capita $25,000,000, shares $5 par. Is a securities holding corporation only. 1908 owned 95% of capital stock of the Greenwater & Death Valley Co., 94% of the capital stock of the United Greenwater Copper Co., an stock issues, except founder's shares, of the Governor Greenwater Cop El Capitan Copper Mining Co., Ironclad Greenwater Copper Co. an Mountain Water Co. Owns the Davis ranch and water rights thro Eagle Mountain Water Co. Development work of subsidiary companie was 4,140'.

GREENWATER COPPER MINING CO. CALIF

Office and mine: Greenwater, Inyo Co., Cal. Arthur Kunze, pr Malcolm Smith, vice-president; Tom J. Gardner, secretary; H. B. Ge urer; preceding officers, John Salisbury and J. S. Wandell, directors. O under laws of South Dakota. Lands, circa 3 miles south of Greenwa claimed to give promising surface indications. Idle.

GREENWATER COPPER MINING CO. CALIF

Office: care of Isaac T. Stoddard, Phoenix, Ariz. Mine office: water, Inyo Co., Cal. Organized 1906, under laws of Arizona, with ca tion $5,000,000. Apparently no work done.

GREENWATER COPPER MINING SYNDICATE. CALIF

Office: care of Wm. T. Virgin, treasurer, Goldfield, Nev. Min Greenwater, Inyo Co., Cal. L. S. Finnegan, president; Fred A. Hussm president; Wells Morton, secretary. Organized 1906, under laws of with capitalization $1,500,000, shares $1 par. Lands, 5 claims, know Hussman group. Idle.

GREENWATER COPPER QUEEN MINING CO. CALIF

Mine office: Greenwater, Inyo Co., Cal. Idle.

GREENWATER COPPER RANGE MINING CO. CALIF

Office: care of Fred H. Begole, Pasadena, Cal. Mine office: Gre Inyo Co., Cal. T. B. Rickey, president; W. H. Wells, vice-president H. Lathrap, secretary; J. L. Lindsay, treasurer; Capt. Thos. Hooper, tendent; preceding officers, J. R. Elgin and E. A. Snowman, directors. ization $2,000,000. Lands, 220 acres, near the Furnace Creek Extens to have a good surface showing. Presumably idle.

GREENWATER & DEATH VALLEY COPPER CO. CALIF

Office: care of Donald B. Gillis, vice-president, Tonopah, Nev office: Greenwater, Inyo Co., Cal. Frank Keith, president; W. L. secretary; Chas. E. Knox, treasurer; preceding officers, M. R. Ward, Clark, T. L. Oddie, Malcolm McDonald and C. B. Zabriskie, directors. ized 1906, under laws of South Dakota, with capitalization $3,000,000 *$1 par.* Is controlled, through ownership of 95% of stock, by Gre

Mines & Smelters Co. Lands, 21 claims, 5 fractional, area 400 acres, first or second locations in the Greenwater district, having ore bodies ...e range 8' to 200' in width, giving assays of 10 to 25% copper, but ...r ore bodies evidently are below commercial grade. Has 5 shafts, ...dance No. 2, of 125' depth, showing a vein of 6' to 10' width, having ... malachite and chrysocolla. Main shaft, 700', planned to be sunk to ...s crosscuts on the 400' and 500' levels. Has four 60-h. p. gasoline ...d a sawmill. Was systematically touted, and vastly overestimated, ...e Greenwater boom, but is one of the few properties of promise in ...ct. Was developing steadily, with circa 40 men, at last accounts.

...ATER DEATH VALLEY COPPER MINING CO. CALIFORNIA.
...: care of C. M. Sumner Investment Securities Co., Denver, Colo. ...e: Greenwater, Inyo Co., Cal. Lands supposed to be 2 claims, 4 miles ...Greenwater. Is regarded with much suspicion, and presumably is a ...k-jobbing enterprise, the title alone being an obvious attempt to play ...name of the Greenwater & Death Valley Copper Co.

...ATER & DEATH VALLEY EXTENSION CO. CALIFORNIA.
...office: Greenwater, Inyo Co., Cal. Malcolm Smith, superintendent.

...ATER EL CAPITAN COPPER CO. CALIFORNIA.
...office: Greenwater, Inyo Co., Cal. Is controlled, through ownership ...stock issue, except founder's shares, by Greenwater Copper Mines & ...Co.

...ATER ELY CONSOLIDATED ...ER CO. CALIFORNIA & NEVADA.
...rs returned unclaimed from former office, 312 O. F. Johnson Bldg., Los ...Cal., and from former mine office, Ely, White Pine Co., Nev. S. M. ...resident; L. Mingus, vice-president; S. F. Crandall, secretary; A. L. ... treasurer. Organized under laws of Arizona, circa November, 1906, ...talization $1,000,000, shares $1 par. Lands, 3 claims at Greenwater ... Ely, White Pine Co., Nev. No development of importance has been ...t either point. Idle and moribund.

...ATER-ETNA COPPER CO. CALIFORNIA.
...: 1215-15 William St., New York, N. Y. Mine office: Greenwater, ... Cal. Organized circa November, 1906, under laws of Arizona, with ...tion $200,000, by John V. Lesher, W. B. Bohrbach and Geo. E. Dep-...

...ATER FURNACE CREEK COPPER CO. CALIFORNIA.
...r returned unclaimed from former office, 219 Citizens National Bank ... Angeles, Cal. Mine office: Greenwater, Inyo Co., Cal. A. H. Busch, ...; Hon. Jas. Lacklan, vice-president; S. E. Cannell, secretary and treas-...eding officers, Hon. Geo. S. Nixon, H. H. Clark, Wm. Bayley and H. ...icott, directors; Maj. J. W. A. Off, general manager. Organized ...1906, under laws or Arizona, with capitalization $1,500,000, shares $1 ...ds, 21 claims, 6 fractional, area 375 acres, in the eastern part of the ...er district, reported by company to show fissure veins in limestone ...ict veins between limestone, ore bodies obviously being remarkable ...o size, shape and occurrence. Company claims 20 ore bodies on its ...th average width of 200' and average length of 3,500', which would ...mpany's entire holding with solid copper veins, with exception of ...0' strips of barren limestone between the 20 veins. Ores are reported ...mpany as melaconite, azurite, chalcocite and occasional chrysocolla, ... 18 to 36% copper tenor. Taking the lowest percentage of ore re-... the company, and the company's own figures as to size of its ore ...e first 100' in *depth on this wonderful property* would carry upwards

of 20,000,000 tons of refined copper, worth, at 13 cents per pound, the comparatively trifling sum of $5,200,000,000. Company was promoted by the McGarvin-Brown Co., which advertised, October, 1906, that the firm would get into a mining proposition where a losing was possible. The fact that major is manager, and a United States senator is vice-president, will prove a great consolation to the shareholders. It is indeed lamentable to note that this magnificent mine, which carries, according to the company's own statements, more copper than all the developed copper mines of the world, is idle and present office address a mystery.

GREENWATER IBEX COPPER & GOLD MINING CO. CALIFORNIA

Mine office: Greenwater, Inyo Co., Cal. Organized November, 1906, under laws of Arizona, with capitalization $1,000,000, by W. W. Jones and F. Ainsworth.

GREENWATER-MOHAWK MINES CO. CALIFORNIA

Office: care of Ernest Kennedy & Co., Goldfield, Nev. Mine office: Greenwater, Inyo Co., Cal. Hon. A. E. Spriggs, president. Organized 1906, with capitalization $1,250,000, shares $1 par. Lands, 5 claims, considered fairly well located. Idle and apparently promoted mainly for stock-jobbing purposes notwithstanding the president being a former governor of Montana.

GREENWATER PAY COPPER CO. CALIFORNIA

Office: care of D. C. Aldridge & Co., fiscal agents, Tonopah, Nev. Mine office: Greenwater, Inyo Co., Cal. T. F. Bonneau, president; H. H. Hunter, vice-president and general manager; L. T. Kibler, secretary and treasurer; preceding officers, D. C. Aldridge and T. S. Jacobs, directors. Organized 190[illegible] with capitalization $1,500,000, shares $5 par. Lands, 5 claims. Idle.

GREENWATER POLARIS COPPER CO. CALIFORNIA

Office: Salt Lake City, Utah. Mine office: Greenwater, Inyo Co., Cal. Organized circa December, 1906, by A. W. Smith and N. O. Nailor, on lands said to carry a 25′ ledge giving assays of 4.5% copper, 0.3 oz. silver and [illegible] cents gold per ton. Idle.

GREENWATER PROSPECTORS EXPLORATION CO. CALIFORNIA

Dead. Was organized early 1907, under laws of South Dakota, with capitalization $250,000, shares $1 par, and was merged, July, 1907, in Copper Mines & Smelters Corporation of America. Company floated the Green Dragon. Officers were E. H. Kramer, president; F. Macpherson, vice-president; E. [illegible] Ewing, secretary and treasurer. Formerly at Greenwater, Inyo Co., Cal.

GREENWATER RED BOY COPPER CO. CALIFORNIA

Office: P. O. Box 227, Goldfield, Nev. Mine office: Greenwater, Inyo Co., Cal. Thos. B. Rickey, president; H. T. Bragdon, vice-president; Robt. B. Tobin, secretary; J. L. Lindsey, treasurer; preceding officers and A. D. Myers, directors; J. R. Fletcher, general manager. Organized 1906, under laws of Wyoming, with capitalization $1,000,000, shares $1 par. Is a twin of the Greenwater-Saratoga Copper Co. Lands, 5 claims, patented, area 100 acres, adjoining the Greenwater & Death Valley Copper Mining Co. on the west, showing ledges, with gossan cappings giving assays up to 28% copper and $66 gold per ton, opened by a 400′ crosscut tunnel and a 600′ shaft. Has a 50-h. p. steam plant. Idle.

GREENWATER-SARATOGA COPPER CO. CALIFORNIA

Office: P. O. Box 227, Goldfield, Nev. Mine office: Greenwater, Inyo Co., Cal. Thos. B. Rickey, president; H. T. Bragdon, vice-president; Robt. B. Tobin, secretary; J. L. Lindsey, treasurer; preceding officers and M. J. Monaco, directors; J. R. Fletcher, general manager. Organized 1906, under laws of Wyoming, with capitalization $1,000,000, shares $1 par. Lands, 5 claims, *patented, area* 100 acres, adjoining the Greenwater Red Boy, of which

y is a twin, opened by a 300′ crosscut tunnel and a 550′ shaft. Has
p. hoist. Idle, but plans sinking and crosscutting, in 1909.

WATER SUNSET COPPER CO. **CALIFORNIA.**

ice: 1215-15 William St., New York, N. Y. Mine office: Greenwater,
, Cal. Organized November, 1906, presumably under laws of Arizona,
. Pike, H. M. Stevens and Wm. M. Mears. Idle and apparently mori-

WATER SUPERIOR COPPER MINING CO. **CALIFORNIA.**

e office: Greenwater, Inyo Co., Cal. Organized under laws of South
with capitalization $1,000,000, shares $1 par. Lands, 4 full and 2
al claims, near the Greenwater & Death Valley. Idle.

WATER VICTOR COPPER CO. **CALIFORNIA.**

e office: Greenwater, Inyo Co., Cal. Organized under laws of New
with capitalization $125,000, by Scott Newcomer and F. L. Rankin.
tly no work done.

WATER-VINDICATOR COPPER CO. **CALIFORNIA.**

e and mine: Greenwater, Inyo Co., Cal. Arthur Kunze, president; J.
rong, vice-president; W. E. Johnson, treasurer; Tom J. Gardner, secre-
eceding officers, Ewald Kunze and Jas. B. Bailey, directors. Organized
1907, under laws of South Dakota, with capitalization $500,000, shares
Lands, 17 claims, 6 miles east of Greenwater. Idle.

WATER WILLOW CREEK COPPER CO. **CALIFORNIA.**

e office: Greenwater, Inyo Co., Cal. Geo. A. Bartlett, president;
Sutro, first vice-president; Henry E. Epstein, second vice-president;
ore, treasurer; G. A. Patteson, Jr., secretary; preceding officers, Alonzo
d W. A. Shockly, directors. Organized November, 1906, under laws of
Idle.

WOOD-PHOENIX TUNNEL CO., LTD. **BRITISH COLUMBIA.**

e office: Phoenix, Boundary district, B. C. Richard Armstrong, gen-
ager. Organized 1908, with capitalization $5,000,000. Company plans
a 3½-mile tunnel from Greenwood to Phoenix, at an estimated cost of
0. Plan is considered of doubtful feasibility.

WOOD SMELTER. **BRITISH COLUMBIA.**

ed by British Columbia Copper Co.

ISCO GREVE G. **CHILE.**

e office: Combarbalá, Coquimbo, Chile. Property is a smelter, known
urazno, 130 kilometers from Los Vilos railroad station, having a small
story furnace, producing Chile bars of about 97% average copper
Production, 1903, was 254,477 lbs. fine copper.

OUND MINING & MILLING CO., LTD. **IDAHO.**

e office: Ketchum, Blaine Co., Idaho. S. M. Smith, superintendent.
iferous copper ore, with steam power, and is said to have a 50-ton

ROCK MINES. **MONTANA.**

East and West Grey Rock mines are owned by the Butte & Boston
lated Mining Co.

ON COPPER MINES CO. **COLORADO.**

ce: care of Thos. Potter, secretary, Denver, Colo. Letter returned
d from former mine office, Pearl, Larimer Co., Colo. Organized Janu-
2, with capitalization $75,000, shares 5 cents par. W. H. Kistler, presi-
ands, 12 claims, near the Colorado and Wyoming line, opened by sundry
l shallow shafts, deepest 70′, showing cuprite and copper sulphides.
eral years and apparently moribund.

ELL ISLAND COPPER CO. **BRITISH COLUMBIA.**

ice: *Fairhaven, Wash. Mine office: Gribbell Island, Skeena River*

division, Cassiar district, B. C. Lands, 2 miles northwest of Canadia
can Copper Mining Co., have several pits, open-cuts and short tunnel
tunnel 354', in a fissure zone in syenite, showing massive bornite with
al chalcopyrite.

GRINDALL MINING & SMELTING CO. A

Office: 200 Epler Blk., Seattle, Wash. Letter returned unclain
former mine office, Ketchikan, Alaska. T. J. Sweaney, superintenden
accounts. Lands, 21 claims, on the Kasaan Peninsula, showing low g
Property said to have been leased, 1905, to Alaska Improvement Co.

GROWLER COPPER CO. A

Office: 14 Kilby St., Boston, Mass. Mine office: Gila Bend,
Co., Ariz. Geo. H. Morrill, Jr., president; Herbert Moseley, secretary a
urer; M. W. Turner, general superintendent. Organized March 19, 19
laws of Maine, with capitalization $2,000,000, shares $5 par. Lands, 2
unpatented, area 560 acres, in 2 groups, also a 25-acre millsite, lying
miles south of Gila Bend, nearest railway station. The Copper Hill
claims, has a contact ledge up to 300' in width, with gossan traceab
1 mile, and is opened by a 75' tunnel and by shafts of 85', 200' and 3
about a quarter-mile of workings, showing oxidized ores, silicates an
chalcocite, near the contact between limestone with quartz and diab
steam power, and has shipped a little ore to Douglas. Property c
promising, though handicapped by inadequate transportation facilitie

GUILLERMO GRUNDY.

Office and mine: Musquituni, Lampa, Puno, Perú. Mine has arg
copper ores. Presumably idle.

FUNDICIÓN METALURGICA DE GUADALAJARA, S. A.

Office and works: Guadalajara, Jalisco, Mex. Diego Moreno,
Justo Fernandez del Valle, vice-president; Alberto Zunigo, treasurer;
Gonzalez y Arias, secretary; Luis Altorra, comissario; José S. Díaz
manager. Capitalization 300,000 pesos. Works include a 100-ton le
and a 100-ton copper matting furnace may be added.

MINA GUADALUPANA.

Mine office: Topia, Tamazula, Durango, Mex. Felix Briones, ow
copper-silver ores. Presumably idle.

GUADALUPAÑO MINING CO.

Dead. Formerly at Torres, Hermosillo, Sonora, Mex.

COMPAÑIA MINERA DE LA GUADALUPE.

Mine office: Santa Engracia, Cuidad Victoria, Tamaulipas, Mex
ized 1907, to open an antigua mine, La Guadalupe, said to have bee
at a profit some years ago. Property, 14 miles from nearest railroad,
show ore averaging 30% copper, which is much too high.

MINA GUADALUPE.

Office: care of Vicente Visconti, Santa Rosalia, Chihuahua, Me
office: Maturana, Hidalgo, Chihuahua, Mex. Property is said to sh
5,000 tons of copper ore. Idle.

MINA GUADALUPE.

Mine office: Muleros, Nombre de Dios, Durango, Mex. José
owner; R. Romo, manager. Development is by open-cut, on a consider
of copper ore. Presumably idle.

MINA GUADALUPE.

Office and mine: care of John Dee, owner, Autlán, Jalisco, Mex
14 pertenencias, 8 miles west of Autlán, show a "manto" or blan
with hematite capping, underlaid by carbonate copper ores, slightly
Apparently could be worked open-cast to advantage. Idle.

ANACEVÍ TUNNEL CO. **MEXICO.**

Office: care of L. Diamond & Co., Old South Bldg., Boston, Mass. Mine e: Guanacevi, Santiago Papasquiaro, Durango, Mex. Hilario Losoya, ident. Lands, said to be circa 8,900 acres, well watered and timbered, and ned to possess large bodies of gold and copper ore. Advertisements of mond in floating this stock contained gross exaggerations, and the com- y is not regarded favorably.

ARDIAN COPPER MINING CO. **MONTANA.**

Dead. Lands sold, 1906, to Butte Coalition Mining Co. Formerly at Butte, er Bow Co., Mont.

NDICIÓN GUAYACÁN. **CHILE.**

Owned by Sociedad Chilena de Fundiciones.

AYNOPA DEVELOPMENT CO. **MEXICO.**

Letter returned unclaimed from former office, Trust Bldg., El Paso, Tex. e office: Temosáchic, Guerrero, Chihuahua, Mex. John A. Rice, general nager; Howard Viedel, superintendent. Property is an antigua, known as Guaynopa, said to carry highly argentiferous and slightly auriferous copper

AYNOPA SMELTING & REDUCTION CO. **MEXICO.**

Dead. Merged, 1904, in International Consolidated Smelting & Mining Co. merly at Temosáchic, Guerrero, Chihuahua, Mex.

AYNOPITA COPPER CO. **MEXICO.**

Office: 24 Broad St., New York, N. Y. Mine office: Temosáchic, Guerrero, huahua, Mex. Col. Wm. C. Greene, president. Organized under laws of st Virginia, with capitalization $5,000,000, shares $10 par. Is controlled, ugh ownership of entire stock issue, by Greene Gold-Silver Co. Lands, m 5,700 acres.

UERRERO COPPER CO. **MEXICO.**

Office: care of Nathan Bickford, president, Washington, D. C. Herbert rne, superintendent. Lands are 5 antiguas, circa 8 miles south of the Mexi- n Central Railroad bridge crossing the Balsas river, in the state of Guerrero, xico, showing ore assaying 13% copper and 40 grams gold per metric ton.

UERRERO DEVELOPMENT CO. **MEXICO.**

Dead. Formerly at Chilpancingo, Bravos, Guerrero, Mex. Described Vol. VI.

UGGENHEIM EXPLORATION CO. **U. S. A. & MEXICO.**

Office: 621-71 Broadway, New York, N. Y. General mine office: Tiburcio , Mexico, D. F. Daniel Guggenheim, president; Morris Guggenheim, vice- ident; Isaac Guggenheim, treasurer; John Hays Hammond, general man- r; preceding officers, S. R. Guggenheim, M. Robert Guggenheim, H. P. Whit- y and Geo. S. Field, directors; Chas. K. Lipman, secretary; W. C. Potter, eral superintendent.

Organized June, 1899, under laws of New Jersey, with capitalization 000,000, increased, July, 1906, to $22,000,000, shares $100 par. Issued, 335,100. Regular dividend rate is 2½% quarterly. The American Smelters urities Co. supposedly was organized to succeed the Guggenheim Explora- Co., but did not. It is said that about 80% of the stock is owned by the genheim brothers. To all practical intents and purposes the company is rolled by the American Smelting & Refining Co., and it is difficult to differ- ate between the holdings of the Guggenheim Exploration Co. and the Amer- Smelters Securities Co. The Guggenheim Exploration Co. holds $13,860,000 A stock, $1,800,000 class C stock and a large amount of common stock in American Smelters Securities Co.

Assets of the company include $912,808 *stock in* the Cumberland-Ely per Co.; $1,671,589 *stock in the Nevada Consolidated* Copper Co.; $1,650,000

bonds of Nevada Northern Railroad Co., and $4,632,283 stock in the Ut
per Co. Company also controlled the Yukon Gold Co., which, in 19
foisted on a credulous public, with the assistance of Thos. W. Lawson,
nership which has greatly injured the standing of the Guggenheims
estimation of the investing public. The company also is supposed to
40% interest in the Kennicott Mines Co., and to control the Dairy Far
in California, the Minas Tepezalanes y Anexas at Tepezalá, Aguasca
Mex., and the Minas Gibosa y Anexas, at Jiménez, Chihuahua, Mex., tho
latter are described under title of American Smelters Securities Co.

Company's balance sheet, as of date Dec. 31, 1907, showed as
$39,879,726, including $541,390 cash and $4,449,976 bills and accounts
able, with $4,153,510 bills and accounts payable, and a surplus of $13,7
The company is said to have expended about $27,000,000 in the purch
properties within the past few years.

GUGGENHEIM-GREENWATER COPPER CO. CALIFORNIA & NE

Mine office: Ely, White Pine Co., Nev. S. M. Mingus, superint
Organized 1906, under laws of Arizona, with capitalization $1,500,000,
$1 par. Lands include the Piñon group, circa 5 miles northwest of Ely,
a shallow 1-compartment shaft, also 3 groups at the mouth of Willow Cr
miles southeast of Greenwater, Inyo Co., Cal. Advertising is flamboya
apparently company is merely a stock-jobbing enterprise.

GULF CREEK, LTD. AUSTR

Dead. Voluntarily liquidated, November, 1904. Formerly at B
N. S. W., Australia.

GULF CREEK MINE. AUSTR

Mine office: Barraba, N. S. W., Australia. Jefferson Bros., op
Lands, 250 acres, in the Gulf Creek district of the Barraba division, 35
north of Sydney and 72 miles from a railroad. Ore bodies include a 9'
7% sulphide ore, also a 5% lense of sulphide ore 25' wide and 350' lon
is very heating, being rich in sulphur. Country rocks are indurated clay
of Carboniferous age, with dikes of serpentine. Has steam power and a
smelter. Production, 1901, was 560 long tons fine copper, from 9,400
ore smelted, and in 1906 was circa 70 long tons fine copper, made fro
long tons ore smelted. Employs 10 men, and is being managed prude
practical men, with fair results.

GUM TREE CONSOLIDATED MINING & MILLING CO. COLO

Mine office: Idaho Springs, Clear Creek Co., Colo. John Owen, s
tendent. Has auriferous and argentiferous copper and lead ores, with
power, employing about 20 men at last accounts.

GUM TREE GOLD MINING & MILLING CO. COLO

Dead. Succeeded by Gum Tree Consolidated Mining & Milling Co.
merly at Idaho Springs, Clear Creek Co., Colo.

GUNN'S PEAK COPPER MINING CO. WASHIN

Office: 217 Columbia St., Seattle, Wash. Mine office: Index, Sno
Co., Wash. Is said to be controlled by the Index-Bornite Copper Mini
Lands, 4 claims, showing 3 veins, widest said to be 25', carrying chalc
and bornite, said to give average assays of 11% copper and circa 2 oz.
per ton. Has tunnels of 125' and 800'.

GWIN MINE DEVELOPMENT CO. CALIFO

Office: 1208 Claus Spreckels Bldg., San Francisco, Cal. Mine
Gwin Mine, Calaveras Co., Cal. F. F. Thomas, general manager; Dav
Clure, superintendent. Organized March 26, 1904, under laws of Cali
with capitalization $1,000,000, shares $10 par. Is said to have paid div
of $456,500 to Jan. 1, 1906, and levied a $20,000 assessment, 1907. P

a gold mine, having steam and water power and a 100-stamp mill, but lands ry a large, undeveloped body of low grade copper ore.

WYNANT COPPER MINES CO., LTD.

Dead. Dissolved, January, 1905. Apparently held no lands.

YMPIE COPPER MINES, LTD. AUSTRALIA.

Dead. Liquidated voluntarily, May, 1904. Formerly at Gallangowan, tzroy Co., Queensland, Australia.

YPSY BLAIR MINING CO. UTAH.

Dead. Lands sold, 1905, to Kennebec Mining Co. Formerly at Brighton, lt Lake Co., Utah.

IACHITA COPPER DEVELOPMENT CO. NEW MEXICO.

Office: P. O. Box 933, El Paso, Texas. Mine office: Hachita, Grant Co., M. W. R. Thurston, president. Organized circa 1907, under laws of New Mexico, with capitalization $200,000, shares $1 par. Lands, 29 claims, 7 fractional, area 550 acres, in the Apache district, 7 miles south of Hachita, carrying 4,000' of the McKinley fault, developed by several shallow shafts, deepest 40', showing copper sulphides of concentrating grade.

HACKBERRY MINING, MILLING & DEVELOPING CO. ARIZONA.

Letter returned unclaimed from former office, 112 Clark St., Chicago, Ills. Mine office: Dewey, Yavapai Co., Ariz. Capt. Geo. H. McGee, general manager. Lands, 7 claims, in the Ash Creek district, circa 12 miles east of Dewey, showing ore carrying mainly gold values.

HADLEY CONSOLIDATED COPPER CO. ALASKA.

Office: 1257-25 Broad St., New York, N. Y. Operating office: 609 Mutual Life Bldg., Seattle, Wash. Mine office: Ketchikan, Alaska. Samuel I. Silverman, president; B. E. Barinds, vice-president and treasurer; Nelson W. Parker, secretary; preceding officers, G. S. Grinsfelder, Alex. Reith and Geo. Brown, directors; G. E. Green, superintendent; Robt. Pollock, mine superintendent. Organized circa 1904, as successor of Wales Copper Mining Co., with capitalization $5,000,000, shares $1 par, in $1,500,000 preferred and $3,500,000 common shares. Is controlled, through stock ownership, by Alaska Mines Securities Co. Paid 1% dividends, Dec. 10, 1905, and January, 1906, and a 4% dividend Oct. 9, 1906. Was placed in the hands of a receiver circa September, 1907.

Lands, 12 claims, partly patented, area circa 200 acres, on Mount Andrew. The principal property, known as the Stevenson mine, has a very large ore body, claimed to be 250' wide and 600' long, developed by 535' of tunnels and glory-holes, and is said to have 58,500 tons of ore blocked out for breaking. Smelter shipments, 1905, gave returns of 3.7% copper, 20 cents silver and $1 gold per ton. Ore carries 32% iron and is practically self-fluxing. Mine is connected with the smelter of the Alaska Smelting & Refining Co., at Hadley, circa 2 miles distant, by railway and aerial tram. Production 1905, was 9,470 tons of ore, yielding 698,486 lbs fine copper, and for 1906 was circa 35,000 tons of ore yielding circa 2,000,000 lbs. fine copper.

HADLEY SMELTER. ALASKA.

Owned by Alaska Smelting & Refining Co.

HAGGARTY COPPER MINING CO. WYOMING.

Mine office: Rudefeha, Carbon Co., Wyo. E. M. Cobb, president. Is controlled, through ownership of entire stock issue except founder's shares, by Penn-Wyoming Copper Co.

HAGGARTY COPPER MINING CO. WYOMING.

Office: 731 Monadnock Bldg., Chicago, Ills. Mine office: Rudefeha, Carbon Co., Wyo. Is controlled, through ownership of practically entire stock issue, by Penn-Wyoming Copper Co.

HAGGARTY-JORDAN COPPER MINING CO. WYOMIN

Office: Watertown, N. Y. Mine office: Battle, Carbon Co., Wyo. C. I Dunbar, president; Delos S. Dunbar, secretary and treasurer. Organized 190 under laws of Delaware, with capitalization $150,000, shares 10c. par. Land 11 claims, area 220 acres, in the Battle Lake district, showing 4 fissure vein of which 2, very slightly developed, are claimed, untruthfully, by the manag ment, to carry carbonate and sulphide ores with average values of 35% co per, a trace of silver and $5 gold per ton. Company suffered a mysterio "burglary," by which all its books and papers were stolen. Is devoid of cas and bankrupt in reputation.

HAGUE & HULBERT EXPLORATION. MICHIGAN

Office: 18 Wall St., New York. Mine office: Laurium, Houghton Co Mich. Lands, 240 acres, in Sections 25 and 26, Town 50 North, Range 33 West bought, 1905. Idle.

HAHN'S PEAK GOLD MINING CO. COLORADO

Works office: Hahn's Peak, Routt Co., Colo. Is said to have a smelte under construction, to treat gold, silver and copper ores of adjacent mines i Routt county, Colorado, and Carbon county, Wyoming.

HALE MINING & MILLING CO. ARIZONA

Mine office: Constellation, Yavapai Co., Ariz. Oscar Jennings, superin tendent, at last accounts. Has gold and copper ores, with gasoline power.

HALIFAX COPPER CO. VIRGINIA

Office and mine: Virgilina, Halifax Co., Va. Property is the Wall mine which shipped a little ore, 1900, but since idle.

HALLIWELL COPPER CO. MICHIGAN

Office: Society for Savings Bldg., Cleveland, Ohio. Mine office: On tonagon, Ontonagon Co., Mich. A. H. Weed, president; John Becker, vice president; Chas. W. Voth, secretary; C. F. Uhl, treasurer. Organized January 1895, under laws of West Virginia, and reorganized, 1901, under laws of Sout Dakota, with capitalization $3,000,000, shares $1 par; bonds, $6,500 issue Lands, 880 acres, owned in fee, in Carp Lake township, carrying sundry co per-bearing amygdaloids, with shafts of 130′ and 190′, and tunnels of 19 and 200′. Has a 60-h. p. steam plant, with hoist and 3-drill air compresso Buildings include a machine shop, shafthouse, rockhouse, smithy and sawmil Idle since 1901.

HALL MINING & SMELTING CO., LTD. BRITISH COLUMBIA

Office: 1 Leadenhall St., London, E. C., Eng. Mine office: Nelson Kootenay district, B. C. Lord Ernest W. Hamilton, chairman; C. Harvey consulting engineer; A. E. Ashley, secretary; J. J. Campbell, general man ager; M. S. Davis, mine superintendent. Organized June 6, 1900, under laws of Great Britain, as a reconstruction of Hall Mines, Ltd., with capitalization £325,000, shares £1 par; issued, £275,000. Debentures, £50,000 authorized; issued, £24,560, first mortgage 6% bonds, redeemable at 105, on 6 months' notice, at option of company.

Lands, 18 claims, area 506 acres, also a 40-acre smelter-site, on Toad Mountain, including the Silver King, Hall and Highland mines, also a quarter interest in the Emma mine, near Summit. Mines produce auriferous and cupriferous silver-lead ores, the Silver King carrying bornite above and argen tiferous tetrahedrite below, the lower levels not looking so well as the upper workings. Values are mainly in silver-lead ores.

The reduction plant, near the mine, includes a sampling mill, laboratory and smelter, latter having one large and one small furnace, originally built *for copper*, but used mainly for lead matting. The smelter has hand and *mechanical* roasters, and adopted, 1906, the Huntington-Heberlein process for

sulphurizing galena. The reduction works, which were not successful as a custom smelter, are somewhat antiquated, and need remodeling.

Production, for fiscal year ending June 30, 1905, was 26,505 tons of ore, of which 17,257 tons were smelted in the company's own furnace, and balance sent to other smelters. In 1906 production was 39,898 short tons of ore. Last reported figures of copper production were 318,124 lbs. for fiscal year 1904.

Company lost money on operations, both 1906 and 1907, and a receiver was appointed Feb. 7, 1908, when property was taken possession of by debenture-holders.

CLEMENTE HAM. **MEXICO.**

Office, mine and works: Promontorios, Alamos, Sonora, Mex. Is a producer of copper ores, which are smelted to matte near the mine. Production, 1902, was 191,200 kgs. matte. Presumably idle.

HAMILTON COPPER MINING CO., LTD. **MONTANA.**

Office: Wallace, Idaho. Mine office, Hamilton, Ravalli Co., Mont. Norman Ebbley, manager. Development is by a shallow shaft.

HAMILTON MINING CO. **MICHIGAN.**

Dead. Lands sold to Copper Crown Mining Co. of Michigan. Formerly at Matchwood, Ontonagon Co., Mich. Described Vol. II.

HAMILTON MINING CO. **WYOMING.**

Office: care A. B. Hamilton, treasurer, Laramie, Wyo. Lands are in Carbon county, Wyoming.

HAMILTON MINING, MILLING & TRANSPORTATION CO. **COLORADO.**

Mine office: Winfield, Chaffee Co., Colo. Mine is opened by shafts and tunnels, showing argentiferous and auriferous copper ores. Presumably idle.

HAMLEY MINING CO. **AUSTRALIA.**

Office: Grenfell St., Adelaide, South Australia. Mine office: Moonta, Daly Co., South Australia. John S. Scott, secretary; Wm. Holland, manager. Lands are in the hundreds of Wallaroo and Taparra. Mine, opened 1861, under name of Karkarilla, has 6 parallel veins, of circa 3' average width, carrying mainly chalcopyrite, with some bornite and occasional chalcocite, with quartz gangue, ore averaging about 3.8% copper, opened by 3 shafts, deepest 720'. Equipment includes a steam plant, 2 hoists, and an air compressor.

The mill has a crusher, 1 set of Cornish rolls, 1 jig and 3 buddles. Property closed down March, 1906, after 25 years' work, and was reopened March, 1907. Production, 1903, was circa 1,060 tons of 17% concentrates, equal to circa 400,000 lbs. fine copper, and for first half of 1905 was 3,169 long tons of ore, yielding 582 long tons of concentrates.

HAMMOND COPPER CO. **MONTANA.**

Dead. Supposedly infested some part of Montana, circa 1902.

HAMPDEN CLONCURRY COPPER MINES, LTD. **AUSTRALIA.**

Offices: 375 Collins St., Melbourne, Australia and Palmerston House, London, E. C., Eng. Mine office: Cloncurry, Beaconsfield Co., Queensland, Australia. Employs circa 50 men. Wm. Knox, M. P., chairman; Hon. Wm. Laurence Baillieu, vice-chairman; preceding officers, D. W. H. Paterson, Herbert J. Daly, Herman H. Schlapp, Hon. Wm. Orr and H. C. F. Keats, directors; T. Fyke, J. Dowling and W. Douglas Reid, London directors; C. Lonsdale Smith, mine manager; Edw. Herbert Shackell, secretary; Edwin Habben, London secretary; S. W. Donner, agent. Organized March 2, 1906, under laws of Victoria, as successor of Hampden Copper Mines, N. L., with capitalization £200,000, increased, February, 1907, to £300,000, shares £1 par; issued, £200,000. Statement of May, 1907, gave cash on hand, £88,050, with liabilities of £22,304, including bank overdrafts of £17,665, these heavy overdrafts seeming strange, in view of the large cash *assets claimed.*

Lands, *260 acres, carrying some timber, 47 miles* south of Cloncurry. The

district is arid, though having occasional heavy rainfalls. Country rocks are Silurian slate and quartzite, with occasional diorite and trap, ore occurring as bunches and stockworks in a belt of kaolinized slate and schist, having a nearly vertical dip, with strike of 15° West of North. Rich ores are very erratic in occurrence. Trenches show copper carbonates disseminated through kaolinized slate for widths of 2′ to 80′, estimated to average about 4% copper. Ore has been proven, at intervals, for a distance of about one-half mile.

Ore was discovered 1884, and mining begun 1898. Development is by a number of trenches, 3 open-cuts and 12 shafts, several of the shafts being mere pits of 8′ to 15′ depth. No. 1 pit is circa 60x80′ in size, and about 18′ deep. No. 2 pit shows large bunches of chalcocite and oxidized ores. Four new shafts have been sunk to depths of 164′ to 240′. No. 2, the main shaft, is 200′ deep, with drifts north and south, showing what is called melaconite, but what probably is chalcocite. No. 2 has levels opened at 45′ and 72′ depth, which is excellently poor practice. Shaft No. 12 shows sulphides on the 80′ level, and the deeper workings show considerable ore of 8 to 9% copper tenor, carrying up to 9 dwts. gold per long ton, with an estimated average of 2 dwts. 10 grains. Under former ownership the property was tributed, and gouged. Company estimated May, 1908, that it had ore reserves of the value of £107,003.

The Duchess mine, area 40 acres, bought of the Cloncurry Railway & Development Co., Ltd., for £15,000 cash and £15,000 shares, has 3 shafts, one, sunk 45′ on a 6′ vein, showing high grade carbonates and chalcocite.

Development has been slow, on account of trouble in landing machinery, mine being difficult of access. The company is said to have joined with the Mount Elliott in guaranteeing half of the cost of a £200,000 railway extension, to be built by the Queensland government, from Cloncurry to Mount Elliott, the share of the Hampden Cloncurry being £60,000. The company has a smelter site, with iron ore and limestone available. Production, under former ownership, to August, 1905, was 9,163 long tons of ore, averaging 12.7% copper, which yielded 1,165 long tons fine copper. Property is considered promising.

HANAWA MINE. JAPAN

Owned by Mitsu Bishi Goshi Kwaisha.

HANCOCK CONSOLIDATED MINING CO. MICHIGAN

Mine office: Hancock, Houghton Co., Mich. John D. Cuddihy, president; Capt. Thos. Hoatson, vice-president; preceding officers, Capt. Jas. Hoatson, Capt. Samuel B. Harris and Allen F. Rees, directors; John H. Hicok, secretary and treasurer; John L. Harris, superintendent; John O. Peterson, mining captain; Daniel Fisher, clerk; C. W. McDougall, engineer.

Organized June 11, 1906, under laws of Michigan, with capitalization $5,000,000, shares $25 par; issued, $2,500,000. Paid in, $13. In 1908 levied $3 assessment, payable in $1 installments, on June 25 and Nov. 25, 1908, and May 20, 1909. Company began business with $1,000,000, and paid $552,623 for its property. Disbursements, 1907, were $264,538.98, of which $227,681.23 was for construction and development. Receipts, 1907, were $7,616.77, all from interest. Surplus, Jan. 1, 1908, was $134,332.25.

Lands, 936 acres, all in Town 55 North, Range 34 West, including the original Hancock mine, area 136 acres, set aside, 1859, by the Quincy Mining Co., which reserved the mineral rights to the Pewabic lode. The Pewabic lode, on lands other than the original Hancock tract of 136 acres, is owned by the Hancock Consolidated. Lands lie adjoining the Quincy, to the southwest, and carry the Pewabic, Quincy West and Hancock or Sumner copper-bearing beds. While the Quincy Mining Co. claims the right to mine the Pewabic bed on the lands of the old Hancock Mining Co., the Hancock Consolidated claims that the Quincy has done unauthorized mining on its lands

there is a prospect of litigation over mining rights. Perhaps the best of the Quincy mine is tributary to No. 7 shaft, which is immediately h of the Hancock boundary.

The old Hancock mine, opened 1861 and closed June 1, 1885, on account the low price of the metal, produced 5,709,384 lbs. fine copper. The Han- k or Sumner amygdaloid, which was worked by the old Hancock company, raged about 12′ in width, below the fifth level, to a depth of 1,052′, where old mine was bottomed, and returned 21 to 22 lbs. fine copper per ton, er selection, making about 50 tons of mineral monthly, secured from an erage daily production of 210 tons of rock, in the latter years of its opera- n. Modern milling methods should save 2 to 4 lbs. of fine copper per ton rmerly lost. The old mine found occasional masses up to 5 tons in weight.

The old Hancock mine had an air-shaft, and an 8x16′ working shaft, now own as No. 1, sunk at an angle of 54°, having 2 small skipways, which being deepened below the old workings with size 8x21′, giving room for compartments, and the shaft will be cut down, before beginning production, full 3-compartment size, from top to bottom. Levels were opened at 100′ ervals in the old mine to the tenth level and below are opened at 125′ in- rvals to the depth of circa 1,400′, in November, 1908. The old mine was und in bad shape, after many years' idleness. Rapid sinking is impossible, ing to the hanging-wall giving much trouble, and requiring very close tim- ring. The best ground was found entirely stoped out in the upper levels the Hancock bed, the old workings, about 800′ in length, having been stoped om the second to the tenth levels inclusive, on the Hancock vein, and the est vein was found stoped from the sixth to the ninth levels, inclusive, on e southern drifts. Though No. 1 shaft is sinking on the Hancock bed, drift- g is mainly on the West lode, which lies about 70′ west of the Hancock mygdaloid, and is 10′ to 12′ wide, with a maximum of 16′, on the thirteenth vel, showing some rich stopes, and very fair average ground throughout. No. 1 has a remodeled wooden shaft-rockhouse, with a Lake Shore hoist good r 2,000′ depth.

No. 2 shaft, 2,200′ northwest of No. 1, is 9x30′ in size over all, having 4 isting compartments, each 7x5′ 2″ in the clear, with a 4x7′ compartment for adderway and pipes. This is one of the largest shafts in the Lake Superior istrict, and is planned for heavy production. The collar is concreted for a epth of 30′, into the rock ledge, with a thickness of 24″ at the top and 30″ at the bottom. This shaft was 1,300′ deep in November, 1908, sunk for the rst 700′ or thereabouts through conglomerate. This vertical shaft should ntersect the Hancock lode at a depth of circa 2,500′, the West lode at circa ,800′, and the Pewabic lode at circa 3,600′, proving considerable territory west of the Pewabic lode, hitherto practically unexplored in the Portage Lake district.

No. 2 shaft has a first-motion Sullivan hoist with 24x48″ cylinders and 2 drums, 8′ in diameter with 9′ face, driven by band-friction clutches, alculated to operate 2 pairs of Kimberly skips in balance, at a speed of ,500′ per minute, hoisting with 1¼″ steel rope. The engine has an automatic top.

There are 2 air-compressors with aggregate capacity of 3,100 cubic feet of free air per minute, connected by pipe-line. The compressor at No. 1 shaft is a 10-drill Sullivan 2-stage machine, and at No. 2 is a 15-drill air-compressor.

The machinery plant and buildings, mainly at No. 2 shaft, include a 16x44′ engine-house, boiler-house and 30x80′ combined machine-shop and smithy, of wood, covered with corrugated iron, on concrete foundation. There also is an office, changing-house, and a *number of dwellings, bought* on property secured

for a railroad right-of-way, which have been remodeled for mine u possible, otherwise serving as dwellings for employes.

About 150 men are employed. It was at first planned to begin p within a year, but the management decided to devote its time and to extensive opening work, before beginning production, and is to mended for this wise decision. The management is experienced and f strong, and is going about the working out of ambitious plans i systematic and efficient manner.

HANCOCK COPPER MINES CO. OF IDAHO, LTD.

Office: 1032 Old South Bldg., Boston, Mass. Mine office: Washington Co., Idaho. Col. C. F. Drake, president and general man M. Palmer, vice-president; John Sennett, secretary and treasurer; officers, M. C. Drake and Dr. J. E. Stevens, directors. Organized 1 capitalization $1,000,000. Lands, 10 claims, on Camp Creek, 2 mi Landore, opened by a tunnel said to show considerable bodies of a copper ore.

HANCOCK COPPER MINING CO. MI

Dead. Organized, circa 1880, as successor of Hancock Mining succeeded, 1906, by Hancock Consolidated Mining Co. Formerly at Houghton Co., Mich. Described Vol. II.

HANCOCK MINES CO. NEW

Dead. Formerly at Organ, Dona Ana Co., N. M. Described Vol.

HANCOCK MINING CO. MI

Dead. Organized 1859, and succeeded, 1880, by Hancock Coppe Co. Formerly at Hancock, Houghton Co., Mich.

HANE COPPER MINING CO. MO

Dead. Formerly at Butte, Silver Bow Co., Mont.

HANNA MINING & MILLING CO. CO

Mine office: Capitol City, Hinsdale Co., Colo. G. H. Martin, sup ent. Has auriferous and argentiferous copper and lead ores, with s electric power and a 100-ton concentrator, employing circa 50 men.

HANOVER COPPER CO. NEW

Office: 905-17 Battery Place, New York, N. Y. Mine office: Grant Co., N. M. Chas. W. White, president and treasurer; R. K. secretary. Organized under laws of South Dakota, with capi $1,000,000, shares $100 par. Company expended circa $75,000 on mini near Hanover, but work was done poorly and property, held on bond lowed to revert to the owner. New claims were secured, but appa work was done on these. Idle some years.

HANOVER MINING CO. MI

Dead. Lands sold, 1906, to Keweenaw Copper Co. Formerly in K county, Michigan.

HANOVER MINING & MILLING CO. NEW

Dead. Formerly at Hanover, Grant Co., N. M.

HAPPY JACK COPPER MINING & DEVELOPMENT CO. A

Office: 904 Tacoma Bldg., Chicago, Ills. Mine office: Valde William Sound district, Alaska. Julius Singer, president and gen ager; H. E. Walrath, secretary; preceding officers, R. H. Dickinson, H Maur, R. A. Weir, Guy H. Powell and Nelson C. Davidson, directors ized January, 1907, under laws of Arizona, with capitalization $ shares $1 par. Lands, on Knights Island, include 6 claims on Mur opened by a 140′ tunnel, and a property on Hoyer Bay, at the nort *of the island*, opened by tunnel and said to show ore averaging 8 to *per, which* seems rather high. Mouth of tunnel is 300′ from what

er. Has several mine buildings and is well spoken of locally. Employed
n 40 men, 1907, and planned making early ore shipments.

PPY JACK MINING CO. **ARIZONA**

Office: care of G. & H. Barnett Co., Philadelphia, Pa. Mine office: Pata
ia, Santa Cruz Co., Ariz. H. W. Barnett, superintendent. Mine is opene
a shallow shaft and a 950′ tunnel, showing auriferous and argentiferou
d and copper ores. Property has shipped considerable ore, of good averag
er, and is considered promising.

APPY JOHN MINE. **BRITISH COLUMBIA**

Mine office: Alberni, Vancouver Island, B. C. A. J. Envik and Frankli
ea, owners. Lands, 4 claims, area 125 acres, west of the Monitor mine, o
e western side of the Alberni canal, near its mouth, having a 175′ tunn
owing a vein with paystreak of 30″ extreme width assaying circa 12
pper, 1.7 oz. silver and $1.20 gold per ton.

ARCÚVAR COPPER CO. **ARIZON**

Office: 1201 Pennsylvania Bldg., Philadelphia, Pa. Mine office: Wend
le, Yuma Co., Ariz. Hon. John J. Hawkins, president; Dennis A. Burl
ce-president; N. A. Lund, secretary and treasurer; preceding officers, An
Andrews and L. B. Woolston, directors; R. R. MacDonald, mine superinte
nt; H. C. Shotwell, engineer. Organized May, 1907, under laws of Arizo
with capitalization $2,000,000, shares $1 par. Annual meeting, first Mond
in May.

Lands, 9 claims, area 180 acres, patents applied for, and a water rig
joining the Oro Cobre, in the Cunningham Pass district, 12 miles west
Yumendale, showing several contact deposits between gneiss and diorite,
which one, of 40′ to 60′ estimated width, traceable for some distance, sh
oxidized ores at surface with chalcopyrite at depth, opened by several p
ting shafts and trenches, and by a 269′ tunnel, giving ore assaying u
5% copper and $20 gold per ton. Has gasoline power and 3 small bu
ings. Company plans reaching the vein by crosscut tunnel at length of 4
and continuing development.

ARDSCRABBLE MINING CO. **NEW MEX**

Office and mine: Magdalena, Socorro Co., N. M. W. A. Brown, lesse
and accounts. Property shows 9 veins, occuring as fissures in granite an
acts between granite and limestone, these being claimed to average a
width, and to carry chalcopyrite, sphalerite and cerussite averaging a
copper, 30% lead, 44% zinc, 12 oz. silver and $1 gold per ton. Mines
200′ shaft and several tunnels, longest 200′ and 300′. Property includ
mill, smelter.

ARLEY GOLD MOUNTAIN MINING & SMELTING CO. **WASHING**

Office: 704 New York Blk., Seattle, Wash. Mine office: Darrin
Skamish Co., Wash. Charles Burns, president and treasurer; Harle
Burns, vice-president; Henry S. Noon, secretary; K. O. Neste, general
ger. Organized Dec. 15, 1900, under laws of Washington, with capitaliza
$500,000. Lands, 16 claims, area 300 acres, in the White Horse dis
showing 12 ore bodies, occurring as fissures in porphyry and as cont
tween granite and porphyry. Four veins under development
erage 6′ width, and to carry 14.5% copper, 8 oz. silver and
which claim is excessive. Development is by tunnel, with
Presumably idle.

O HARNECKER.

Office and mine: Las Gredas, La Ligua, Aconcagua,
Ligua, Aconcagua, Chile. El Carmen mine shows
t 1 meter average width, with dip of 31°, occurring
ween limestone *and porphyry, ores being sulphide*

about 20 meters depth. Mine has a 90-meter tunnel with a 60-meter and about 140 meters of horizontal workings. Shipped, 1903, circa 1,100 n tons of ore averaging 5.2% copper, secured with 22 men, and had ore re of about 16,000 metric tons. Is considered a promising property.

Los Marquis mine shows 8 parallel veins, traceable about 5 kilom occurring in porphyry, with strike of North 18° East and dip of 43°, widths of 5′ to 9′, carrying chalcopyrite with granitic gangue, ore being cially suitable for fluxing the silicate ores so common in the district. duction, 1903, was circa 2,000 metric tons of 4.5% ore, secured with 26

Smelter, known as the Fundicion Peña Blanca, 5 kilometers from the tion of Injenio, has a cylindrical water-jacket blast-furnace of about 30 daily capacity, using Westphalian coke and producing ejes of about average copper tenor, giving very clean slags, which assay only 0.15 to 0. copper, from ore of 4.68% average tenor. Production, 1903, was 310,848 fine copper. Mines and smelters are well managed and successful, despite average tenor of ore treated.

HARRINGTON MINING CO. ARIZO

Mine office: Crown King, Yavapai Co., Ariz. Geo. P. Harrington, eral manager. Property is the Tiger mine, carrying ores of gold, silver copper. Has steam power. Idle several years.

HARRIS COPPER CO. MEX

Mine office: Moctezuma, Sonora, Mex. Organized circa 1908. Land miles east of the Pilares mines of the Moctezuma Copper Co., include Caridad group, supposed to have been bought for $40,000, which is sai have 6,000 tons of ore blocked out averaging 4 to 6% in copper tenor. T also are 25 hectares of other lands, in the Pilares district.

H. C. HARRISON. MEX

Office: Apartado 74, Monterey, N. L., Mex. Mine office: Cerralvo, Cu Nuevo León, Mex. Property includes the Buenos Amigos and Esper mines, carrying argentiferous copper and lead ores. Has steam power small smelter, employing circa 100 men at last accounts.

HARTFORD CONSOLIDATED COPPER CO. CALIFOR

Mine office: Redding, Shasta Co., Cal. Wm. Geary, president; J. Giffen, secretary. Lands, 10 claims, 3 miles north of the mouth of Pr Creek, showing an 8′ vein carrying oxidized ores at and near surface, with grade sulphides at a little depth, opened by circa 400′ of tunnels. Idle several years.

HARTFORD COPPER & GOLD MINING CO. ALASKA & IDA

Office: 7 Exchange Pl., Boston, Mass. Henry J. Wilkins, president; C M. Thayer, secretary. Capitalization $2,000,000. West Virginia charter feited 1902. Claims to have copper lands on Prince of Wales Island, Ala Had an option on a mine at Challis, Custer county, Idaho, but lost it. M agement bad, property problematical, stock worthless.

HARTFORD MINING CO. IDA

Mine office: Wardner, Shoshone Co., Idaho. Wm. F. Goddard, presid Jas. Fumerton, vice-president; W. J. Fumerton, secretary and treasurer; ceding officers, Vido Marich, and William Shaefer, directors; Robt. Sterl consulting engineer. Organized circa 1901. Lands, 5 claims, having a tunnel on a fissure vein said to show an 18′ ore chute carrying auriferous argentiferous copper and lead carbonates.

HARTWIG MINING CO. IDA

Office: Tipton, Ia. Mine office: Pollock, Idaho Co., Idaho. Dr. R Nash, president; W. G. N. Geiger, secretary; J. W. Moore, treasurer; pre *ing officers, Fred* Goldsmith, Wm. Hartwig and Ernest Conrad, directors; *Hartwig, mine* superintendent. Organized 1905, under laws of Iowa,

capitalization $72,000. Lands, 6 claims, patented, area 80 acres, and a 5-acre millsite, in the Rapid River district, showing a contact deposit between limestone and diorite, of 40′ estimated average width, traceable circa 700′, opened by a 75′ shaft and 3 tunnels of 1,000′ aggregate length, showing malachite and chalcopyrite, estimated by company to average 12% copper, 3 oz. silver and $4 gold per ton. The 875′ lower tunnel has cut the ore zone, which shows but little ore. Has 3 mine buildings. Idle on account of lack of transportation facilities, but plans resumption when railroad comes nearer.

HASKINS MINING CO. **ARIZONA.**

Mine office: Tucson, Pima Co., Ariz. Lands are in the Tucson Mountains. Idle.

HASSAYAMPA COPPER CO. **ARIZONA.**

Office: 281 John St., Portland, Me. Mine office: Groom Creek, Yavapai Co., Ariz. C. H. Altmiller, president; Chas. Sumner Smith, treasurer; R. A. Sweet, general manager; preceding officers, E. P. Ricker and Harold N. Willis, directors; Millard W. Baldwin, clerk. Organized Dec. 24, 1906, under laws of Maine, with capitalization $2,000,000, shares $5 par; issued, $1,355,480. Property consisted, February, 1907, of about 60% of the stock issue of the Gold & Copper Consolidated Mining & Milling Co., and the Hassayampa Copper Co. is supposed to be negotiating for balance of stock issue of the subsidiary corporation.

Lands, 34 claims, 15 patented, area circa 650 acres, fairly watered and timbered, in 4 groups, known as the Little Kid, which is the most important, Rockefeller, Chicago and President, 12 miles southeast of Prescott in the Hassayampa and Big Bug districts. Lands show numerous fissure veins carrying auriferous and argentiferous oxidized and sulphide ores, claimed by old management of Gold & Copper Consolidated Mining & Milling Co. to average 7% copper, 46 oz. silver and $38 gold per ton, which figures are gross exaggerations. Development is by 34 pits and shafts, of 10′ to 815′ depth, and by 21 tunnels, of 20′ to 800′ length, with about 2 miles of workings. The old company claimed to have 150,000 tons of ore blocked out for stoping, which was untrue, and the new company is said to have opened 3 new veins, carrying copper, silver and gold ores assaying $25 to $200 per ton in value.

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Equipment includes steam power and a 50-h. p. hoist, with several shops. The Chicago group has a 10-stamp mill and a 50-ton cyanide plant, and was claimed by old management to have a 50-ton concentrator.

The directorate of the Hassayampa Copper Co. includes several men of excellent standing, and also includes R. A. Sweet, the general manager, who was the former president and treasurer of the Gold & Copper Consolidated Mining & Milling Co., which corporation peddled stock as long as possible, and claimed to be running the mill day and night, which was untrue. It was claimed, March, 1907, in behalf of the new company, that the Hassayampa would become an important producer, with quick dividends from gold alone, but these claims were not made good. Apparently the company expended about $12,000 on development work, in 1907. Notwithstanding the fact that some of the officers of the Hassayampa Copper Co. are good men, the company is not regarded favorably.

HASSAYAMPA GOLD & COPPER MINING CO. **ARIZONA.**

Dead. Formerly had an office at 202 North Ninth St., St. Louis, Mo. Formerly in Yavapai county, Arizona.

HASTINGS (BRITISH COLUMBIA) EXPLORATION SYNDICATE. **BRITISH COLUMBIA.**

Dead. *Property was the Arlington mine,* which, in 1906, shipped 1,312

tons of ore to the Hall smelter that gave net returns of $53,315.80, an a
of $40.64 per ton. Formerly at Greenwood, Boundary district, B. C.

HATASA MINE. JA

Mine office: Hatasa-mura, Gujo-gori, Mino, Japan. Mine was
previous to A. D. 1600, and once was highly productive, but declined
in output, until latterly. Property has 4 principal veins, of 2" to 2'
carrying argentiferous chalcopyrite, galena, sphalerite and pyrite. Prod
was 38,651 lbs. fine copper and 165,416 momme silver in 1900, and 82,1
fine copper and 189,838 momme silver in 1907, showing a fair growth.

HATHAWAY MINE. ME

Owned by Chihuahua Copper Mining Co.

HATTIE BELL COPPER, GOLD & NICKEL MINING CO. ONT

Dead. Lands sold to Consolidated Copper Co., of Parry Sound. Fo
at Parry Sound, Parry Sound district, Ont.

HATTIE GOLD AND COPPER MINING CO. ID

Dead. Formerly at Doniphan, Blaine Co., Idaho.

UNION MINIÈRE DU HAUT-KATANGA. CONGO FREE S

Office: 7 Montagne du Parc, Brussels, Belgium. Mine office: L
du Congo, Katanga, Congo Free State. Baron Baeyens, chairman; Robt
iams, vice-chairman and general manager; H. Buttgenbach, managing di
Geo. Velge, secretary; A. Bertholet, resident director; Allan Gibb, con
engineer.

Organized Oct. 28, 1906, under laws of Congo Free State, with capi
tion £200,000, shares £4 par, divided into £100,000 dividend shares and £
capital shares, 40% paid in. The Tanganyika Concessions, Ltd., and
Générale de Belgique each own £100,000 in shares. Annual meeting, firs
day in December.

Lands are very extensive, being a concession comprising a copp
about 200 miles in length, containing over 100 exposures of copper, and
belt of nearly 100 miles length, north of the Kafue and Zambesi rivers,
Katanga district, in a rolling country with a fairly healthy climate, th
cipal copper properties showing sandstone carrying malachite impreg
estimated by company to average 14% in tenor.

In addition to copper properties the company owns promising tin
these including the Busango mine, which has apparently payable str
deposits in alluvium of 3' to 10' thickness, and the Kasonso and Chienzi
having lode-tin deposits.

The company also owns the Ruwe gold mine, which has an ore b
9' to 14' width, opened for a quarter-mile by several shallow shafts, d
circa 100' only, vein being a sandstone reef carrying gold up to 9 oz. 7
per long ton, and claimed to average 5 dwts. gold and 9 dwts. platinum
occasional palladium, gold being quite coarse. The platinum figures s
lack substantiation. The Ruwe mine also has a placer deposit, estima
contain 20 oz. gold per long ton, from which considerable production ha
secured, at an average cost of only circa 12s. per ton.

In addition to ores of copper, tin, gold, platinum and palladium, th
pany has an iron ore deposit, apparently of promise, near Shamerenga,
Lualaba River.

The company reports a force of 1,000 men employed, and smeltin
said to be in progress, early 1908, but it is probable that the smelter
small capacity, and planned mainly for experimental purposes.

SOCIÉTÉ DES CUIVRES ET PLOMBS ARGENTIFÈRES DU HAUT-RHONE. FR

Offices: Lausanne, Switzerland, and 28 Blvd. St.-Denis, Paris, F

Jan. 17, 1905, with capitalization 1,600,000 francs, shares 100 francs

E COPPER MINING CO. **WYOMING.**
Formerly at Encampment, Carbon Co., Wyo. Described Vol. VII.

E MINE. **OREGON.**
and mine: Comer, Grant Co., Ore. Byron Sherbindy, owner. Prop-
es auriferous and argentiferous copper ores, and is said to have a
ter. Idle.

ORTH COPPER CO. **ARIZONA.**
Formerly at Agua Caliente, Maricopa Co., Ariz.

D MINES, LTD. **ENGLAND.**
Voluntarily liquidated, February, 1905. Formerly at St. Ives,
Eng.

MINING & TUNNEL CO. **COLORADO.**
office: Tarryall, Park Co., Colo. Lands, sundry claims, said to show
opper ores. Idle and apparently moribund.

COPPER CO. **ARIZONA.**
1112 Union Trust Bldg., Los Angeles, Cal. Mine office: Jerome,
o., Ariz. Clarence L. Bleakley, president; H. Judson Haynes, vice-
J. R. Kinney, secretary and treasurer; preceding officers, Edwin E.
. Ferguson, and Dr. G. H. Merkley, directors; T. E. Campbell, super-
Organized October, 1907, under laws of Arizona, with capitaliza-
0,000, shares $1 par, as successor of Jerome Mines Development Co.
8 claims, patented, area 160 acres, known as the Harryhousen
joining the United Verde on the north. Property shows lenticular
occurring as replacements in schist, the two under development, of
width, traceable circa 2,000′, carrying a great variety of ores, esti-
company to average 6.2% copper, 3 oz. silver and $1.60 gold per ton.
has been explored by about 2,000′ of diamond drill borings, and is
a 248′ tunnel and by shafts of 350′, 520′, 45′ and 40′, main shaft
compartments. Mine is proving quite wet.
ine has a 150-h. p. steam plant, 12x16″ double-drum hoist, 10-drill
and air-compressor and 12 buildings. Company plans continuing
velopment by deepening the shaft to 700′, and driving 2 crosscuts
body.

INING CO. **MONTANA.**
returned unclaimed from former office and mine, Butte, Silver Bow
. T. J. Nerny, Peter Sanger and Jerry Sullivan, directors. Organ-
26, 1906, under laws of Montana, with capitalization $1,500,000,
par. Apparently no work was done.

HT COPPER MINING CO. **WYOMING.**
Formerly at Encampment, Carbon Co., Wyo. Described Vol. II.

HT GOLD & COPPER MINING CO. **CALIFORNIA.**
2115 South Union Ave., Los Angeles, Cal. Mine office: Needles,
rdino Co., Cal. C. R. Wischart, secretary. Organized circa Decem-
under laws of Arizona, with capitalization $1,000,000. Lands, about
est of Needles, are being opened by a shaft, which has proven wet.

HT GOLD MINING & MILLING CO. **COLORADO.**
office: Spencer, Gunnison Co., Colo. L. C. Ehbeding, superintend-
t accounts. Ores carry gold, silver and copper. Presumably idle.

GOLD & COPPER CO. **COLORADO.**
Central City, Gilpin Co., Colo. Henry W. Kane, manager. Organ-
under laws of Colorado, with capitalization $500,000. Property is a
d and lease on the Anchor mine, in Willis Gulch, idle for some years
ned by the Newhouse tunnel, showing considerable bodies of low

grade copper and lead ores, and medium grade silver ores. Apparently copp values are small. Plans an electric installation.

HEART OF ARIZONA GOLD & COPPER CO. ARIZON

Dead. Lands sold, 1906. Formerly at Prescott, Yavapai Co., Ariz.

HEATH MINING CO. IDAH

Dead. Formerly at Heath, Washington Co., Idaho.

HECKLEY GOLD & COPPER MINING CO. ARIZONA

Office: care of Arnold Nydegger, secretary and treasurer, Colorado Spring Colo. Mine office: Wickenburg, Maricopa Co., Ariz. F. J. Webber, pres dent; L. J. Markert, vice-president. Organized under laws of Arizona, wit capitalization $1,500,000, shares $1 par. Lands, 13 claims, in 3 groups, Copper Hill, in the Black Rock district, circa 6 miles east and northeast Wickenburg, having a 268′ tunnel cutting veins of 6′, 10′ and 25′ claim average width, showing ore assaying up to 28% copper.

HECLA & ARIZONA DEVELOPMENT CO. ARIZONA

Dead. Title changed, 1903, to Red Jacket & Bisbee Development Co. Fo merly at Bisbee, Cochise Co., Ariz.

HECLA & ARIZONA GOLD & COPPER MINING CO. ARIZONA

Office: Weatherford, Texas. Letter returned unclaimed from form mine office, Bisbee, Cochise Co., Ariz. J. M. Carroll, manager. Organize 1902, to take over claims near Bisbee. Idle and apparently moribund.

HECLA CONSOLIDATED MINE. MONTAN

Office and mine: Butte, Beaverhead Co., Mont. Henry Knippenber owner. Property is the Atlantis, Cleves and other mines, formerly owned t the Hecla Consolidated Mining Co., which for 20 years were large produce of silver and lead, with considerable gold and copper, latter reaching 100,0 lbs. fine copper yearly. Property paid dividends of $2,250,000 on an origin investment of $40,000, but was bought, 1906, at sheriff's sale, for $28,000.

HECLA CONSOLIDATED MINING CO. MONTAN

Dead. Was a large producer, for many years, of silver, lead, gold a copper, latter as a by-product, amounting to about 100,000 lbs. yearly, a paid dividends of $2,250,000, without assessments, on an original investme of $40,000. Property sold, 1906, for $28,000, to Henry Knippenberg. Forme at Dillon, Beaverhead Co., Mont.

HECLA COPPER & GOLD MINING, MILLING & SMELTING CO. WYOMIN

Dead. Reorganized, October, 1904, as Hecla Mining Co. Formerly Hecla, Laramie Co., Wyo.

HECLA COPPER MINING CO. WYOMIN

Dead. Formerly at Encampment, Carbon Co., Wyo. Described Vol. II.

HECLA MINING CO. WYOMIN

Office: 1624 Curtis St., Denver, Colo. Mine office: Hecla, Laramie C Wyo. Henry Schwartz, president and general manager; Geo. C. Norris, vi president; Louis Williams, secretary; Geo. L. Bettcher, treasurer. Organi October, 1904, under laws of Wyoming, as a reconstruction of the Hecla C per & Gold Mining, Milling & Smelting Co., with capitalization $1,000,0 shares $1 par.

Lands apparently include the Copper Crown group of 8 claims, the A gamated group of 11 claims, the Hecla group of 14 claims, 2 patented, a acre millsite and the townsite of Hecla, 5 miles from a railroad, in the Si Crown district. Property is claimed to show 16 fissure veins, of 8′ ave width, in schist and granite, of which 3, of 7′ average claimed width, claimed to be under development, carrying oxidized and sulphide ores, cla to give average assays of 5% copper, 3 oz. silver and $10 gold per ton, *addition* to which they are claimed to carry estimated average values of

$12 per ton in nickel, platinum and uranium, which values apparently are something more than doubtful. Development is by a 40′ tunnel, and 14 pits and shafts of 10′ to 140′ depth.

The mill, 80x100′ in size, has 15 stamps, a 50-ton concentrating plant and a leaching plant. The Ohly process was installed, in an attempt to save the rare metals, but was not a success. Ore, which is mainly low in grade, is only in part adapted to concentration, and the mill requires overhauling and adaptation to the ore.

The management peddled "guaranteed" stock, claiming that 5% interest was guaranteed, for 3 years, on the stock investment, by United States government bonds, but nobody seems to have seen the bonds. The company apparently is out of cash and hopelessly involved, and its officers should be prosecuted for peddling worthless "guaranteed" stock.

GEWERKSCHAFT HEDWIGSGLÜCK. **GERMANY.**

Dead. Lands sold, 1907, to Rheinbach Copper Mines, Ltd. Formerly at Rheinbach, Rheinprovinz, Germany. Described Vol. VII.

F. H. HEFFRON. **MEXICO.**

Office and mine: Miñaca, Guerrero, Chihuahua, Mex. Mine, known as Dos de Abril, carries auriferous and argentiferous copper and lead ores, and has a 30-ton mill, employing circa 50 men.

HELENA-BUTTE MINING CO. **MONTANA.**

Mine office: Clancey, Jefferson Co., Mont. Frederic E. J. Lloyd, president; Chas. J. Burgess, secretary. Organized under laws of Montana. Property, known as the Silver Crest mine, opened circa 1890, in Warm Spring Gulch, 6 miles from Clancey, has a 3-compartment 200′ shaft, showing mainly silver-lead ore, with fair copper and gold values, and with prospects of increasing copper at depth. Property has a fair power equipment and several small mine buildings.

HELENA COPPER MINING CO. **MONTANA.**

Letter returned unclaimed from former office and mine, Helena, Lewis & Clark Co., Mont. F. J. Mason, president; Peter Rattray, vice-president; I. H. Adams, secretary; A. E. Adams, treasurer. Organized January, 1906, under laws of Montana, with capitalization $80,000, shares 10 cents par. Lands, 5 claims, unpatented, area 80 acres, on Mount Ascension, one mile from Helena, having sundry pits, and shafts of 45′, 50′ and 220′. Idle and apparently moribund.

HELEN MINING CO. **NEW MEXICO.**

Mine office: Graham, Socorro Co., N. M. Thos. Graham, president. Property is the Confidence group, ores of which carry gold, silver and copper. Has a 20-stamp mill, with steam, water and electric power. Presumably idle.

HELGA GOLD & COPPER CO. **BRITISH COLUMBIA.**

Office: Sullivan Bldg., Seattle, Wash. Mine office: Clayoquot, Vancouver Island, B. C. B. F. McCurdy, superintendent. Lands, 5 claims, area circa 250 acres, known as the Good Hope group, on Trout river, developed by a tunnel, said to give a fair showing of ore.

HELLEN MINING SYNDICATE. **WASHINGTON.**

Mine office: Cle Elum, Kittitas Co., Wash. Lands carry copper ore and free milling gold. Development is mainly on the gold ores, a small stamp mill having been built, 1908.

HELSINGBORG'S KOPPARVERK AKTIEBOLAG. **SWEDEN.**

Office and works: Helsingborg, Malmöhus län, Sweden. Hon. N. Persson, manager. Property is a smelting and reduction plant, including a small leaching plant, treating mainly the unrefined copper of the Sulitelma Aktiebolag.

HELVETIA COPPER CO. **ARIZONA.**

Office: 905 Metropolitan Life Bldg., Minneapolis, Minn. Mine office:

Helvetia, Pima Co., Ariz. Employs circa 75 men. C. C. Prindle, presi
Chas. W. Sexton, vice-president and secretary; Wm. A. Paine, treasurer;
ceding officers, Russell M. Bennett, Geo. A. McDougall, Jas. H. Seager
Fred. L. Smith, directors; W. C. Steubing, general manager. Organized M
3, 1899, under laws of New Jersey, and reorganized Oct. 4, 1905, under law
Arizona, with capitalization $5,000,000, shares $25 par; issued, $2,250
Paid in, $13.50. Last assessment was 50 cents, payable July 20, 1908.
on hand, Sept. 1, 1908, was circa $80,000. Annual meeting, in October.

Lands, 48 claims, patented, area 825 acres, and 960 acres miscellan
lands, giving total holdings of 1,785 acres, on the western slope of the S
Rita Mountains, 30 miles southeast of Tucson. Formation resembles tha
Bisbee, the Carboniferous limestone strata being of the same geological
zon, with similar porphyritic intrusions, but showing much stronger outc
and gossans.

The mine made an exceptionally fine showing from a depth of 35',
ores turned base on the third level, with average tenor under 5% copper.
property has about 25 old pits and shafts, with about a mile of trenches
open-cuts, and several miles of tunnels and drifts, showing considerable
serves of self-fluxing ore of 2.5 to 8% copper tenor. There are 5 principal
bodies, known as the Isle Royale, Old Dick, Exchange, Pilot and Heavy We
with principal new development on the Copper World mine, which show
vein of 15' estimated width, traceable 3,000', proven to depth of 400', carry
carbonate and sulphide ore, mainly the latter, estimated by company to a
age 5% copper, 0.5 oz. silver and 50 cents gold per ton.

The Isle Royale mine has an 800' shaft, and shows lenses of ore in li
stone near a porphyritic contact, of 3' to 5' average width, with maxim
of 15', carrying ore averaging about 3% copper and $1 per ton in comb
gold and silver values. The lower levels show sulphide ore, and this s
furnishes sufficient water for mine and smelter use.

The Old Dick mine has an open-cut showing an ore body carrying 3 to
copper, with small gold and silver values, and a 127' shaft, with one le
is said to show about 7,000 tons of 7% sulphide ore. There also is a tu
leading to an open pit, showing a vein of about 7' width, claimed to ave
better than 5% in copper tenor.

The Heavy Weight vein, of about 7' width, circa 400' from and ne
parallel with the Old Dick vein, carries sulphide ore at shallow depth of
5% copper tenor. This vein shows a considerable amount of low grade
centrating ore.

The Copper World mine, opened circa 1907, has a 350' incline shaft
sulphide ore estimated to average about 5% copper, with some 10% ore sh
on the 300' level. It is planned to connect this shaft with the Isle Re
mine.

The Leader mine shows considerable sulphide ore of 3.5 to 4% estima
average copper tenor.

The mine has a 250-h. p. steam plant with steam hoists of 25-h. p.
50-h. p., and one gasoline hoist, also a 9-drill Ingersoll-Sergeant air-compre
and an electric light plant. There are about 30 buildings, a 40x75' carpen
shop and dwellings.

The Helvetia railroad, owned by the company, is 2¾ miles in length
30" gauge, equipped with one 10-ton Porter saddleback locomotive, one 15-
Shay locomotive and 5 cars. A railway line has been surveyed from Helv
to Vail, to connect at latter point with the Southern Pacific.

The first smelter, 1½ miles from the mine, built 1899, and burned
1900, was rebuilt and blown in, 1901, and property was closed down
1902, owing to the exhaustion of the rich oxidized ores. During the

riod of operations, about 27,000 tons of ore were smelted, largest production ving been circa 1,000,000 lbs. fine copper in 1901. Property was reopened, 04, and the smelter was again blown in, early 1906, but was wrecked, circa ay, 1906, by the collapse of the ore-bins, which had been built on a poor undation. The smelter was again rebuilt, and has a 100-ton water-jacket last-furnace. In 1908 the company experimented with a 30-ton Medbery otary oil burning furnace, which treated 2-ton charges, at frequent intervals, ut this did not prove successful.

The matter of building a 500-ton concentrator has been considered. Considerable trouble has been experienced in the past from lack of fluxing ores, but these seem to have been developed on the property. Daily shipments of 100 tons to custom smelters were begun Nov. 1, 1908.

Production, 1906, was 379,823 lbs. fine copper, 3,888 oz. silver and 28 oz. gold, valued at $76,446, and for 1907 was 191,666 lbs. fine copper, 1,394 oz. silver and 6 oz. gold, valued at $39,387.54. The mine has considerable ore of fair tenor developed, and is considered promising, though present transportation facilities are inadequate.

WM. HENDERSON & CO., LTD. **SCOTLAND.**

Works office: Irvine, Ayrshire, Scotland. Property is a plant for the leaching of copper values from cinders remaining from the burning of cupriferous pyrites.

HENSON CREEK LEAD MINES CO. **COLORADO.**

Dead. Lands sold by sheriff, circa 1906. Formerly at Lake City, Hinsdale Co., Colo.

HERCULES & ARIZONA MINING CO. **ARIZONA.**

Mine office: Ray, Pinal Co., Ariz. Was developing with a small force, at last accounts.

HERCULES BOSHOF SYNDICATE. **TRANSVAAL.**

Mine office: Pietersburg, Zoutpansberg, Transvaal. Lands are part of the Farm Tweedale No. 1300, showing a ledge of about 150′ width, traceable 2 miles, carrying carbonate stains and small quantities of cuprite, azurite and malachite, with quartzite gangue.

HERCULES CONSOLIDATED MINING CO. **COLORADO.**

Office: Boston, Mass. Mine office: Silverton, San Juan Co., Colo. Edward P. Bicker, president; Chas. S. Smith, treasurer; Thos. H. Kane, managing director. Capitalization $1,000,000, shares $10 par. Has authorized an issue of $300,000 bonds at 6%, convertible into stock at par; outstanding, $253,000. Lands, 25 claims, area circa 300 acres, known as the Little Dora group, having tunnels of 1,500′ and 2,500′, showing auriferous and argentiferous lead and copper ores, with values mainly in gold and silver. Has steam and water power and a modern 30-stamp mill, employing circa 75 men at last accounts.

HERCULES COPPER CO. **ARIZONA.**

Mine office: Ray, Pinal Co., Ariz.

HERCULES GOLD & COPPER CO. **NORTH CAROLINA.**

Office: 81 Fulton St., New York, N. Y. Mine office: Cid, Davidson Co., N. C. Wm. A. Anderson, president; H. L. Prentice, vice-president; Robert E. Nuese, secretary; Saml. G. W. Brown, treasurer and general manager; Walter Cockrell, superintendent. Organized May, 1901, under laws of South Dakota, with capitalization $1,000,000, shares $1 par. Lands, circa 1,000 acres, freehold, and 1,300 acres held under contract, including the Emmons mine, opened before the American Civil War. Lands show 3 fissure veins, ranging 18″ to 12′ wide, said to give average assays of 7% copper, 2 to 17 oz. silver and $1.50 to $15 gold per ton, from melaconite, bornite and chalcopyrite, mainly latter. Is opened by shafts of 90′, 140′, 450′ and 600′, and by tunnels of 100′, 100′, 1,500′ and 2,500′, estimated to show about 65,000 tons of ore blocked out for

Development has been continuous, since begun in 1903. The mine has a 260' tunnel and 3 shafts, No. 1 being 300' deep, No. 2 being 24' deep and No. 3 being 445' in depth, with total of 2,624' of workings, June, 1908, estimated by company to show 800,000 tons of ore with 400,000 tons blocked out for stoping, which estimate seems high. No. 3 shaft, 445' deep, 7x15' in inside measurement, with 3 compartments, has 4 levels opened. No. 4 shaft is to be sunk on the Duluth claim, circa 1,000' from No. 3. The ground stands well, requiring little timbering.

Equipment includes a 200-h. p. steam plant, with 50-h. p. and 100-h. p. Allis-Chalmers hoists, good for 1,000' each, and a 10-drill Ingersoll-Rand air-compressor.

There are 21 buildings, including a 20x40' frame machine-shop, a frame carpenter-shop, an 18x32' smithy, boiler-house, engine-house, office and dwellings. The Hermina railroad, 5 miles long, of standard gauge, equipped with one locomotive and 10 cars, connecting the mine with the Canadian Pacific railway, is owned by the company.

The smelter, at Thessalon, Algoma, Ontario, is owned by a subsidiary corporation, the Algoma Custom Smelting & Refining Co., and is described under that title. Production was begun circa Nov. 1, 1908, when there were about 8,000 tons of ore on the dump. The company estimates earnings of $371,000 yearly, on a production of 115 tons of ore daily, which figures are not likely to work out in practice. The property has considerable good ore, though not in the best of shape for extraction, being somewhat bunchy.

HERMIONE COPPER MINES, LTD. **GREECE.**

Letter returned unclaimed from former office, 2 City Road, London, E. C., Eng. Edw. Riley & Co., managers; Wm. Taylor, secretary. Organized Apr. 6, 1905, under laws of Great Britain, with capitalization £140,000, shares £1 par; issued, £7. Succeeded Greek Minerals, Ltd., to acquire the Hermione mine, consisting of the Thermissy and Careas concessions, in the districts of Hermione and Spetzia, Greece. Idle and moribund.

HERMIT GOLD & COPPER MINING & SMELTING CO. **ARIZONA.**

Dead. Formerly owned the Hermit group in Coconino county, Arizona.

HERMIT LAKE COPPER CO. **COLORADO.**

Office: 31 Milk St., Boston, Mass. Mine office: Silver Cliff, Custer Co., Colo. John H. Norton, president; Oliver J. Kimball, secretary; W. S. Klemendorf, superintendent. Organized 1899, under laws of Maine, with capitalization $2,000,000, shares $20 par. Ores carry gold and copper. Has water power and a 20-stamp mill. Idle and apparently moribund.

HERMOSA COPPER CO. **NEW MEXICO.**

Office: 42 Broadway, New York, N. Y. Mine office: Hanover, Grant Co., N. M. Anson W. Burchard, president; M. F. Westover, secretary; D. M. Kinnan, treasurer and general manager; Henry K. Darling, assistant treasurer; L. B. Judson, assistant secretary. Organized July 20, 1905, under laws of New Jersey, with capitalization $500,000, shares $100 par. Corporation Trust Co., New York, registrar. Annual meeting, first Monday in June.

The mines were discovered circa 1800, and opened 1880, but were worked intermittently, owing to various Indian troubles and lack of funds, until taken over, 1904, by the present owner, which practically is the General Electric Co., one of the strongest corporations of the United States.

Lands, 114 claims, area circa 2,200 acres, held partly in fee and partly under option, all in the Central or Hanover district. Lands include the Ivanhoe and Humboldt mines, which are the most important, also the Copper Queen, Treasure Vault, Wild Cat, Kinney, Tourmaline, and other mines and attempts at mines. Country rocks are porphyry, granite, quartzite and lime-

stone, showing various contact deposits between granite and limestone, porphyry intrusions, ores occurring as lenticular bodies, in veins with a erally northeasterly and southwesterly strike, and an average dip of circa Four different ore bodies are being developed, these ranging 15′ to 2 width, with a known depth of 410′ and known length of 2,000′. Develop is by shafts, as follows: Ivanhoe, 350′; Ninety, 410′; Treasure Vault, Wild Cat, 410′; Humboldt, 300′; Copper Queen, 200′; Tourmaline, 300′; M 200′. All shafts show ore, and the various mines have about 3 miles of w ings, estimated to show 100,000 tons of ore, with 25,000 tons blocked out stoping. The property shows large bodies of low grade concentrating carrying average values of 3% copper, 3 oz. silver and slightly under $1 per ton, with small quantities of lead near the surface, and occasional tr of zinc, but not in sufficient quantities to materially hamper reduction.

Equipment includes a 700-h. p. steam plant, with 7 hoists, good for to 1,000′ each, and 4 Sullivan air-compressors, of 26 drills aggregate capa Buildings include a 20x40′ machine-shop and smithy, a 40x100′ carpenter-s and framing-mill, warehouse, sawmill, etc., with a total of 20 buildings, al wood. The 40x90′ concentrator, of 100 tons rated daily capacity, built b former management, was altered and used for experimental purposes. Eq ment includes a No. 14 Blake crusher, 2 sets of rolls, 1 Hartz jig, 5 Overst tables, 2 Wilfley tables, 7 screw sizers, 1 hydraulic sizer and 1 Huntington

Considerable systematic development was done, based upon estimate tonnage by eminent engineers, but results did not come up to expectati Though some very good ore bodies were found, they were not of sufficient to make the property profitable. Further work may be done at a later date.

MINA LAS HERREBIAS. SPA

Held by Bede Metal & Chemical Co., Ltd.

HERSTELLE-ELY COPPER CO. NEVA

Office: 20 Broad St., New York, N. Y. Mine office: Ely, White Pine Nev. Seward H. Fields, secretary. Organized circa February, 1907, u laws of Maine, with capitalization $1,000,000, shares $1 par.

HESPERUS GOLD & COPPER MINES CO. BRITISH COLUMB

Office: care of Samuel P. Brannan, secretary, 709-145 La Salle St., cago, Ills. Mine office: Grand Forks, Boundary district, B. C. Chas. J. Ma president; T. H. Rae, managing director. Organized February, 1903, with italization $1,000,000, shares $1 par. Property includes the Betts, Hesp Lancaster and Chicago claims, on Hardy Mountain, circa 4 miles from G Forks, developed by several hundred feet of crosscuts and shafts, show good bodies of cupriferous pyrrhotite, opened by an 825′ tunnel. Has about 3,000′ of diamond drilling.

HETTA MOUNTAIN GROUP. ALAS

Mine office: Coppermount, Prince of Wales Island, Alaska. Land claims, near Copper Harbor, said to show a vein 2′ to 20′ wide and 3,000′ l averaging 10% copper, 3 oz. silver and $2 gold per ton, which is an exagg tion. Idle.

HETTIE GREEN MINE. BRITISH COLUMB

Office and mine: care of James Thompson, owner, Alberni, Vancou Island, B. C. Lands, on Tranquil Creek, Bear River district, Clayoquot d sion, give a fair showing of chalcopyrite, with occasional bornite. Ship 1905, circa 200 tons of ore to the Tyee smelter.

HIAWATHA GOLD & COPPER MINING CO.

Office: Coronado Bldg., Denver, Colo. Location of lands, if any, unkno Apparently a stock-jobbing outfit.

***HIBBE* GOLD & COPPER MINING CO.** CALIFORN

Office: Sheridan, Cal. N. H. Kaiehner, president; Geo. Grutman, se

ary and treasurer. Organized 1903, with capitalization $75,000, to operate in California. Idle and apparently moribund.

HIBERNIAN COPPER SYNDICATE, LTD. **IRELAND.**

Dead. Organized May 7, 1907, with capitalization £2,000, shares £1 par; liquidated Oct. 25, 1907. Formerly in Ireland.

HIBIRA MINE. **JAPAN.**

Mine office: Kitakata-mura, Higashi-Usuki-gori, Hyuga, Japan. Property is located on the eastern bank of the Tsunansegawa, a branch of the Gokasegawa river, giving deep water transportation. The property is an old mine, which was a considerable producer at the close of the Seventeenth Century.

Property carries mainly cupriferous pyrite, with some chalcopyrite, averaging 5 to 6% in copper tenor, in lenses with maximum thickness of 20', occurring in clay-slate and sandstone. Production was 1,769,498 lbs. fine copper in 1900, 2,166,102 lbs. in 1906, and 1,880,839 lbs. in 1907.

HICKEY COPPER, LTD. **TRANSVAAL.**

Office: Exploration Bldgs., Johannesburg, Transvaal. Louis L. Playford, Hon. W. A. Martin, A. Keeling and M. C. Inglis, directors; Ball & Stuart, secretaries. Organized August, 1908, under laws of Transvaal, with capitalization £3,000. Lands are 288 base metal claims, on the Motale and Lumbuvi rivers, in the Zoutpansberg district, showing a vein carrying chalcocite assaying up to 40% copper, said to be traceable 4 miles, opened by several prospecting shafts.

J. F. HICKS & CO. **TENNESSEE.**

Mine office: Bristol, Sullivan Co., Tenn. Lands are slightly developed, showing copper. Idle some years.

HIDACHI MINE. **JAPAN.**

Mine office: Hidachi-mura, Taga-gori Hitachi, Japan. Production was 377,560 lbs. fine copper in 1906, and 1,775,417 lbs. fine copper in 1907. Is a new property of considerable promise.

HIDALGO COPPER MINING & SMELTING CO. **MEXICO.**

Mine and works office: Zimapán, Hidalgo, Mex. Capitalization $2,000,000, shares $10 par, in half preferred and half common shares. Lands, 13 hectares, including 9 leased mines. The Concordia and Purisima mines produce mainly silver-lead ores, but property also has argentiferous copper ores. Smelter has a 25-ton lead stack and 30-ton copper stack.

HIDALGO MINING CO. **MEXICO.**

Mine office: Moctezuma, Sonora, Mex. Wm. Adamson, president; Capt. John Birmingham, general manager; E. L. Mahoney, superintendent. Organized under laws of Arizona, with capitalization $3,500,000, shares $1 par. Lands, 80 pertenencias, area 198 acres, in 3 groups, known as the Hidalgo group of 11 hectares, Pilares group of 9 hectares and Bataimole group of 71 hectares, lying 4 miles from the Nacozari railroad and circa 6 miles west of Moctezuma Copper Co. Property shows an ore body of 40' to 200' estimated width, occurring as a contact deposit between granite and limestone, with a 12' paystreak carrying mainly chalcopyrite and bornite, with occasional cuprite and melaconite, assaying 15 to 30% copper and up to 500 oz. silver per ton, with some lead. Mine has a 135' tunnel and 300' shaft, with about 3,000' of workings. A spring on the property carries water assaying up to 6.5 grains copper per gallon. Property considered promising and management good. Presumably idle.

HIDDEN TREASURE MINES CO. **NEVADA.**

Mine office: Ely, White Pine Co., Nev. Organized circa February, 1907. Presumably idle.

HIDDEN TREASURE *MINING CO.* **MONTANA.**

Office and mine: Higgins Blk., Missoula, Missoula Co., Mont. John P.

Graves, agent. Organized circa May, 1908. Lands, 6 claims, patented, in ... Wallace district, carrying 3 contact veins between slate and porphyry, ... vein being said to show 40' of concentrating ore, and a 30" paystreak of ... phide ore giving smelter returns of 13% copper, 28 oz. silver and $5.50 g... per ton, average value of ore being estimated, by former owner, as 6% copp... 12 oz. silver and $3.75 gold per ton, which probably is too high. Mine ... opened by shafts of 68' and 149', and by tunnels of 558' and 1,300', with ... 3,000' of workings. Made small shipments, 1905-1906, under former ownersh... to the East Helena and Tacoma smelters.

HIDDEN TREASURE MINING & MILLING CO. WASHINGTO...

Office: 428 Pacific Blk., Seattle, Wash. Mine office: Methow, Okanog... Co., Wash. Jas. West, treasurer and general manager. Organized 1896. H... a fissure vein of 2' to 4' average width, with occasional chutes of 8' to 1... width, traversing gneiss and carrying auriferous and argentiferous galen... sphalerite and chalcopyrite, with quartz and calcite gangue. Smelter shipm... of 90 tons gave returns of $67 per ton. Presumably idle.

HIDDEN TREASURE MINING & TUNNELSITE CO. WYOMIN...

Office: 1106 O St., Lincoln, Neb. Letter returned unclaimed from form... mine office, Encampment, Carbon Co., Wyo. John T. Dorgan, secretary; H. ... Rice, manager. Lands, 9 claims, patented, having about 950' of tunnels, s... to give a promising showing of auriferous and argentiferous copper ores. Id...

HIGASHIYAMA MINE. JAPA...

Mine office: Higashiyama-mura, Oe-gori, Awa, Japan. Ore is chalcopyri... associated with iron pyrites, occurring in lenses lying in quartz schist, a... averaging 2 to 2.5% copper. Latest recorded production, 1898, was 104,4... lbs. fine copper. Idle.

HIGGINS DEVELOPMENT CO. ARIZON...

Dead. Formerly at Bisbee, Cochise Co., Ariz. Very fully described Vo... IV and V.

HIGGINS MINE. ARIZON...

Office: care of Thos. Higgins, owner, Los Angeles, Cal. Mine office: B... bee, Cochise Co., Ariz. Fully described, under title Higgins Development C... Vols. IV and V.

HIGHLAND BOY CONSOLIDATED MINING CO. UTA...

Dead. Wound up, 1906. Formerly at Bingham Canyon, Salt Lake C... Utah. Described Vol. VI.

HIGHLAND BOY GOLD & COPPER MINING CO. UTA...

Mine office: Bingham Canyon, Salt Lake Co., Utah. Is controlled, throu... stock ownership, by Utah Consolidated Mining Co., and property is descri... under title of latter.

HIGH ORE GOLD & COPPER MINING CO. MONTAN...

Office: care of Mrs. Ella Knowles Haskell, secretary, Butte, Mont. L... ter returned unclaimed from former mine office, Basin, Jefferson Co., Mo... Organized under laws of Montana, with capitalization $150,000, shares $1 p... Lands are several patented claims and 2 water rights, 5 miles from Ba... Mine has a 1,900' tunnel, showing ore of fair grade. Idle several years.

HIGH ORE MINE. MONTAN...

Owned by Anaconda Copper Mining Co.

HIGH TOP COPPER MINING CO. VIRGIN...

Office: 1552-150 Nassau St., New York, N. Y. Mine office: Elk... Rockingham Co., Va. Morris D. Brown, president; Prentice W. Brown, sec... tary and treasurer; S. D. Brown, general manager. Lands, circa 1,000 acres, ... Greene county, Virginia, 7 miles from the Norfolk & Western railroad, s... *to show* 3 wide fissure veins, carrying carbonate and sulphide ores, la... *claimed* to contain average values of 6% copper, 10 oz. silver and $15 gold ...

ton, which is entirely too high. Apparently development consists of a 140' shaft and some open-cuts. Has steam power. Idle and apparently moribund.

HIGLEY MINE. **VERMONT.**

Mine office: Corinth, Orange Co., Vt. Suspended, circa November, 1907, on account of low price of copper.

MINA LA HIGUERA. **CHILE.**

Mine office: Higuera, La Serena, Coquimbo, Chile. Was a small producer at last accounts.

HIKO NEVADA MINING CO. **NEVADA.**

Mine office: Hiko, Lincoln Co., Nev. Is said to have a 3' vein, traceable some distance, giving average assays of 4.1% copper, 6.3% lead and 46 oz. silver per ton. Presumably idle.

MINA HILDA. **CHILE.**

Mine office: Higuera, La Serena, Coquimbo, Chile. Richard H. Everitt and Juan Bode, owners and managers. Lands, 2 pertenencias, area 10 hectares, 12 miles north of Higuera, carrying 3 parallel veins in diorite and granite. Main vein, circa 30' wide, at surface, shows chrysocolla and carbonate ores of good tenor, opened by shafts of 20' and 50' Ore, as produced, averages about 13% copper, after selection, and is sold to the Sociedad Minera San Juan. Completion of a projected railroad will permit shipment of low grade ores, of which the mine apparently possesses large quantities.

HILETA GOLD & SILVER MINING CO. **MEXICO.**

Mine office: Velardeña, Cuencamé, Durango, Mex. Carter Barker, general manager. Lands, 79 acres, also 63 acres miscellaneous lands, including the Hileta or Yleta, San Mateo and Santa Rita mines, latter being the principal property, adjoining the Velardeña mines. Country rocks are limestone and porphyry, showing 5 veins, of which one, of 12" to 3' width, opened by a 1,600' tunnel, with about 4,000' of workings, carries ore said to average 2% copper, 7% lead, 5% zinc, 60 oz. silver and $4.50 gold per ton. Equipment includes a steam plant, with two hoists, good for 1,000' each, and a 4-drill air-compressor.

HILLMAN COPPER CO., LTD. **ONTARIO.**

Office and mine: Sault Ste. Marie, Algoma, Ont. T. W. Trotter, president; Edw. Ewing, vice-president; Hugh McKinnon, secretary and treasurer. Organized 1907, under laws of Ontario, with capitalization $60,000, shares $10 par, as a holding and promotion company, with the plan of floating a larger company later. Lands, 640 acres, in the township of Aweres, near the Root River mine, on the main line of the Algoma Central railway, showing ore assaying up to 10% copper and 8 oz. silver per ton.

HILLSBORO CONSOLIDATED MINES CO. **NEW MEXICO.**

Dead. Was a swindle. J. N. A. Connor was president and general manager. Succeeded the Philadelphia Mining & Milling Co. Formerly at Hillsboro, Sierra Co., N. M.

P. C. HILLS & CO. **SPAIN.**

Operators of Compañía del Ferrocaril y Minas del Buitron.

HILLSIDE COPPER MINING CO. **NEVADA.**

Dead. Merged, June 4, 1906, in Bristol Consolidated Mines & Smelting Co. Formerly at Pioche, Lincoln Co., Nev. Described Vol. VI.

HIMMELFAHRT FUNDGRUBE. **GERMANY.**

Office: care of Kgl. Sächs. Staatsfiskus, Dresden, Germany. Mine office: Freiberg, Saxony, Germany. K. Stephan, manager. Is owned and operated by the Saxon Crown, employing circa 1,000 men, and is a producer of silver-lead ores, with small incidental production of copper.

HINDS CONSOLIDATED MINING CO. **MEXICO.**

Office: 1 Wall St., New York, N. Y. *Mine office:* Santa Bárbara, Hidalgo, Chihuahua, *Mex. Howell Hinds, president* and general manager; R. W.

Cavanaugh, vice-president and secretary; Wm. W. Elmer, mine superintendent. Organized circa 1907, with capitalization $5,000,000, shares $1 par. Lands include the Santa Gertrudis, La Reforma, Los Medios and Clarinas mines, circ 3 miles west of Santa Bárbara, showing 3 parallel fissure veins of 4' to 3 width, outcropping for about one mile, carrying sulphide ores. La Reform mine gives ore assaying up to 20% lead and 2% copper, with silver value Other mines carry gold ores. Idle at last accounts.

HINSDALE TUNNEL & REDUCTION CO. COLORADO

Mine office: Lake City, Hinsdale Co., Colo. H. S. Bushnell, superintendent. Succeeded, circa 1907, the Henson Creek Lead Mines Co. Lands, known as the Bonanza group, carry auriferous and argentiferous lead and copper ores. Has water and electric power and a 50-ton concentrator.

HIRAKANE MINE. JAPAN

Mine office: Nibukawa, Rikuchu, Japan. T. Yokoyama, owner; S. Tsubouchi, superintendent. Has argentiferous copper ores, 1906 production being 960,351 lbs. fine copper and 988,519 grams silver. Largest recorded production in 1903, was 1,169,637 lbs. fine copper. Property has steam and electric power.

HISAMUNE MINE. JAPAN

Mine office: Kawada-mura, Oe-gori, Awa, Japan. Is a comparatively new property. Ore, which is chalcopyrite, slightly argentiferous, and averaging 4% copper, occurs imbedded in clay-amphibolite, beds ranging 2' to 5' in thickness. Production, 1899, was 112,196 lbs. fine copper. Idle.

HISANICHI MINE. JAPAN

Mine office: Nakagawa-mura, Senhoku-gori, Ugo, Japan. Main vein has a strike of North 60° East, with steep dip to North of Northwest, and is 1' to 4' in width, carrying chalcopyrite associated with galena, sphalerite and pyrite, all slightly argentiferous, principal values being in copper and silver. Production, 1900, was 566,268 lbs. fine copper and 134,074 momme silver, increased 1906, to 1,444,464 lbs. fine copper and 1,012,012 grams silver, and again increased, 1907, to 1,574,499 lbs. fine copper and 229,680 momme fine silver. Management is progressive.

H. J. & F. H. COPPER MINING CO. NEW MEXICO

Letter returned unclaimed from former mine office, La Luz, Otero Co., N. M. F. W. Hunt, general manager; M. J. Cox, superintendent. Lands, in the Highrolls district, include the old Courtney mine, 8 miles east of La Luz, carrying argentiferous lead and copper sulphides. Made considerable shipments, 1907, to El Paso smelter.

HOFMAN CLAIMS. CALIFORNIA

Office and mine: Ukiah, Lake Co., Cal. Lands, 4 claims, showing carbonate and sulphide ores assaying 6% copper, 2 oz. silver and $5 gold per ton. Idle several years.

HOGASHO MINE. JAPAN

Mine office: Hatayama-mura, Aki-gori, Tosa, Japan. Ore is chalcopyrite, associated with pyrite, averaging about 7% copper, and occurs in lenses in country rocks of shale and sandstone, with intercalated red and green schalstein. Latest recorded production, 1900, was 138,032 lbs. fine copper. Presumably idle.

GEWERKSCHAFT HOHENSTAUFEN. GERMANY

Mine office: Essen, Rheinprovinz, Germany. W. Brandenburg, president. Produces yearly about 3,000 metric tons of zinc and copper ores, zinc ores predominating.

HOKOISHI MINE. JAPAN

Mine office: Kamo-mura, Nii-gori, Iyo, Japan. Ore is chalcopyrite, associated with pyrite, averaging 3.5 to 4% in copper tenor, occurring in n

average width, traversing chlorite-amphibolite. Production, 1900, lbs. fine copper. Presumably idle.

EXTENSION GOLD & COPPER MINING CO. **WASHINGTON.**
Formerly at Chelan, Chelan Co., Wash.

GOLD & COPPER CO. **WASHINGTON.**
Spokane, Wash. Mine office: Chelan, Chelan Co., Wash. J. H. ce-president; Chas. H. Wolf, secretary; A. L. White, treasurer; Wm. liams, general manager.
, 3 claims, area 60 acres, on Railroad Creek, near Lake Chelan, 3 tunnels, longest 500', with circa 2,000' of workings on 3 levels, and open-cuts, showing a vein of 40' to 185' width, carrying low grade copper ores. New management is strong and experienced, and the though low in grade, has large ore bodies, and is considered prom-

GOLD & COPPER MINING CO. **BRITISH COLUMBIA.**
Formerly at Princeton, Similkameen division, Boundary district,

MINING CO. **NEVADA.**
171 Broadway, New York, N. Y. Mine office: Ely, White Pine W. A. Douglas, president and general manager; Samuel Marshall, ent; E. L. Hollis, secretary and treasurer.

AY MINE. **VIRGINIA.**
office: Virgilina, Halifax Co., Va. Property, the old Holloway or e, 6 miles north of Virgilina, first worked previous to the American shows sulphide ores, mainly chalcopyrite, carrying small gold and es. Was a small producer, 1900-1903. Idle.

LIME CO. **CALIFORNIA.**
Mutual Savings Bank Bldg., San Francisco, Cal. Mine office: Placer Co., Cal. Lands, 180 acres, known as the Alabaster Cave iles east of Newcastle, showing a strong gossan, traceable several in, between limestone and slate, is 12' to 20' wide, with a paystreak said to carry 4% copper ore. Idle several years.

MINING & MILLING CO. **WISCONSIN.**
and mine: Mellen, Ashland Co., Wis. C. A. Poundstone, president; es, vice-president; A. W. Peterson, secretary and general manager. 1902, under laws of Wisconsin, with capitalization $150,000, shares ar. Lands, 80 acres, in the Penokee district, showing 3 veins carry- copper and sulphide copper ore assaying 30 oz. silver and $3.70 gold ened by a 140' shaft. Idle several years.

PPER CO. **ARIZONA.**
and mine: Morenci, Graham Co., Ariz. H. J. Degener, president; onard, vice-president; W. P. Gee, secretary and treasurer; N. L. perintendent. Organized April, 1901. Lands, 35 claims, area ... in 2 groups, also a millsite on Eagle River. The Peacock group ... claims, about one mile southwest of Morenci, is opened by ... by tunnels of 150' and 700', latter giving a 500' back. Ores ... d oxides, with some chalcocite, also a wide ledge of low ... r present working. The Buzzard Shadow group of 12 ... , about one mile north of the Peacock group, shows ... ng gold ore worth up to $50 per ton, slightly ... A $125,000 bond on the property was surrendered, ... ond drilling.

PPER CO.
ffice: Cle-Elum, Kittitas Co., Wash. Idle and ...

HOME COPPER MINING CO. MICHIGA

Mine office: Copper Falls, Keweenaw Co., Mich. Lands, 240 acres, a joining the Humboldt mine, in Town 57 North, Range 32 West. Did a lit exploratory work, circa 1864. Never a producer and long idle.

HOME COPPER MINING CO. MONTAN

Dead. Disincorporated, 1903, with all debts paid. Formerly at Copp opolis, Meagher Co., Mont.

HOME GOLD & COPPER CO. NEW MEXIC

Dead. Formerly at Cooney, Socorro Co., N. M.

HOME GOLD & COPPER CO., LTD. ONTARI

Dead. Formerly infested Ontario. Described Vols. IV and V.

HOME RUN COPPER MINING CO. WYOMIN

Office: 34 Giddings Bldg., Colorado Springs, Colo. Letter returned u claimed from former mine office, Rudefeha, Carbon Co., Wyo. A. L. Bohr president; J. F. Humphrey, vice-president; Adolph Fehringer, treasurer; W C. Robinson, secretary. Capitalization $1,500,000, shares $1 par. Lands, l acres, partly patented, known as the Copper Bell group, near the Ferris-Ha gerty mine of the Penn-Wyoming Copper Co., having a 350′ tunnel showing vein of 30″ to 9′ width, giving assays up to 12% copper, with gold and silv values. Was developing with a small force at last accounts.

HOMESTAKE MINES, LTD. BRITISH COLUMBI

Mine office: Rossland, Trail district, B. C. Ores carry gold, silver a copper. Idle some years and apparently moribund.

HOMESTAKE MINING CO. ARIZON

Dead. A petty swindle that advised investors to withdraw their mon from savings banks before they "busted," and put it in Homestake, "sure pay one per cent per month." Formerly at Jerome, Yavapai Co., Ariz.

HOMESTEAD COPPER, GOLD & SILVER MINING CO. WISCONSI

Office and mine: Iron Mountain, Dickinson Co., Mich. Eric Hager, pre dent; Andrew Nelson, secretary; E. W. Holm, treasurer. Organized 1906, und laws of Wisconsin, with capitalization $1,000,000, shares $1 par. Lands, miles south of Iron Mountain, are in Florence county, Wisconsin. Has 2 sh low shafts, deepest circa 100′, showing a vein 2″ wide at surface, with extre width of 18″ at depth, giving assays, from selected samples, up to 10% copp and circa $3 per ton in combined gold and silver values. Idle.

HOMESTEAD COPPER MINES CO. OREGO

Mine office: Homestead, Baker Co., Ore. L. L. Carter, superintende Organized 1906, under laws of Arizona, with capitalization $1,000,000, sha $2 par.

HONERINE EXTENSION MINING CO. UTA

Mine office: Stockton, Tooele Co., Utah.

HONERINE MINING & MILLING CO. UTA

Mine office: Stockton, Tooele Co., Utah. F. A. Baird, president; C. Dupont, secretary; Chas. O. Ellingwood, general manager; W. K. Murdo superintendent. Has a 10,800′ drainage and transportation tunnel, on the L level, costing circa $1,000,000. Ore is mainly silver-lead, with more or copper secured as a by-product, smelting ore averaging about 50% lead, copper, 30 oz. silver and $1.50 gold per ton, and concentrating ore averag 15% lead, 1% copper, 12 oz. silver and 80 cents gold per ton. Has a 300- mill putting about 3½ into 1, which is said not to have been a metall success. Company, in connection with its twin, the Honerine Tunnel & M Co., owed, 1908, the sum of $222,292.66, and was to be sold by the sheriff

HONERINE TUNNEL & MILLING CO.

Mine office: Stockton, Tooele Co., Utah. A twin of the Honerine *& Milling Co.*, and very closely connected with same.

HONEST ENDEAVOR MINING CO.

Mine office: Yerington, Lyon Co., Nev. B. W. [illegible] Hoff, vice-president; C. S. Wood, secretary; F. D. [illegible] ral manager. Organized 1907, under laws of Arizona, [illegible] 2,500,000, shares $1 par. Lands, 4 claims, area 80 [illegible] having an 80′ shaft showing a vein up to 3′ in width, [illegible] opper, with small gold and silver values. Has gasoline [illegible]

HONEYBUGLE COPPER MINES, N. L.

Office: 93 Pitt St., Sydney, Australia. Mine office: [illegible] W. S. W., Australia. Colin Y. Caird, chairman. Organized 190[illegible] New South Wales, with capitalization £3,000, shares £1 par. [illegible] and arid, but show an ore body, apparently of considerable [illegible] development.

HONGROISE DES MINES, COMPAGNIE.

Office: Brussels, Belgium. Mine office: Urvölgi, Hung[illegible] de Ferré de Peroux, chairman. Organized February, 1905, [illegible] gium, with capitalization 1,500,000 francs. Dividend, for [illegible] francs 50 centimes. Controls, through stock ownership, [illegible] Mine de Cuivre Urvölgi, which owns the Urvölgi mines in [illegible]

HONJYO COPPER WORKS.

Owned by Furukawa Mining Co.

HOOSIER COPPER MINING & MILLING CO.

Office: Shelbyville, Ind. Letter returned unclaimed [illegible] office, Encampment, Carbon Co., Wyo. Capitalization $[illegible] Lands, 9 claims, area 180 acres, developed by a shallow [illegible] fair showing of medium grade ore. Idle and apparently [illegible]

HOP CAÑON MINING & SMELTING CO.

Office: 85-163 Randolph St., Chicago, Ills. Mine [illegible] Co., N. M. Alpheus McCallum, president; Elias [illegible] treasurer. Capitalization $1,000,000, shares $1 par. [illegible] acres, 3 miles from a railroad, in the Hop Cañon district, [illegible] copper, lead, zinc, silver and gold. Idle.

HORACE GREELEY & SACRED MINING CO.

Dead. Formerly at Bingham Canyon, Salt Lake [illegible]

HORMIGAS, COMPAÑIA MINERA LAS.

Mine office: Charcas, Moctezuma, San Luis [illegible] superintendent, at last accounts. Has argentiferous [illegible]

HORN SILVER MINING CO.

Office: 17 Battery Place, New York, N. Y. [illegible] Co., Utah. Allan C. Washington, president; [illegible] Ambrose I. Harrison, secretary and treasurer; [illegible] Organized 1879, under laws of Utah, with [illegible] U. $25 par.

The company has paid dividends of $[illegible] has for 1907 being $60,000, though the quarter[illegible] 3, passed. The

Mine is extensively developed, and [illegible] ving silver and gold, securing a little copper [illegible] rnace having been 129 tons copper ore, of [illegible] and mine carries good values at a [illegible] Moro- Stewall, with a little copper ore [illegible] 20-stamp mill.

Production, 1906, was valued at $[illegible] LIVIA. $110,181. Production, 1907, was [illegible], Potosí, fine, 206,537 oz. silver and [illegible] hairman consulting

was 717,353 lbs., in 1902. Mining was suspended, circa 1907, for first time in 20 years, because of temporary inability to market ore.

HORSESHOE COPPER CO. IDAHO

Mine office: Mackay, Custer Co., Idaho. D. E. McCallum, manager. Lands, 17 claims, adjoining the White Knob mine of the Empire Copper Co. on the north. Presumably idle.

HORSE SHOE COPPER MINING CO. ARIZONA

Dead. Was a brazen swindle for which directors were jailed. Formerly at Safford, Graham Co., Ariz. Described Vol. V.

HORSESHOE GOLD MINING CO. COLORADO

Mine office: Central City, Gilpin Co., Colo. Property is the Barnes mine carrying gold, silver and copper ores. Presumably idle.

HORSE SHOE MINING CO. WASHINGTON

Office: 231 Epler Blk., Seattle, Wash. Letter returned unclaimed from former mine office, North Bend, King Co., Wash. Swan Hansen, president and general manager; E. G. Moe, vice-president; S. P. Battleson, secretary and treasurer; preceding officers, Thos. Jones, O. E. Olson and O. Battleson, directors. Capitalization $1,000,000, shares $1 par. Lands, 11 claims, with 2 mill sites and several water rights, well watered and timbered, 12 miles east of North Bend, carrying a vein up to 25′ in width, opened by 2 tunnels showing chalcopyrite assaying 8 to 32% copper, with gold and silver values. Idle and presumably moribund.

HORSFAL MINING CO. COLORADO

Dead. Formerly at Gold Hill, Boulder Co., Colo.

HOUGHTON ALASKA EXPLORATION CO. ALASKA

Office: Houghton, Mich. Mine office: McCarthy Creek, Copper River district, Alaska. Ocha Potter, manager; Prof. Arthur E. Seaman, consulting engineer. Organized circa 1905, under laws of Michigan, with capitalization $500,000.

Lands, 26 claims, area 380 acres, of which 12 claims, area 180 acres, are in process of patenting, with balance of claims held by location, also a 5-acre millsite and 160 acres placer lands, held for townsite and general purposes. Lands adjoin the Bonanza group of the Kennicott Mines Co., on the northeast, and are on the McCarthy Creek slope of the divide, the Bonanza group being on the Kennicott slope. About 1,000 h. p. is available from McCarthy Creek for a hydro-electric installation.

The Bonanza fault, traceable circa 7,000′, consists of 6″ to 12′ width of brecciated limestone, with variable mineralization, latter occasionally up to 100′ in width, on the fault and along the stratification planes of intersecting veins. The Bonanza fault has a series of fissures cutting the main fault, with mineralization along both, at and near the points of intersection, but where other fissures intersect the cross-fissures, only the Bonanza fault is mineralized. Ore is exclusively chalcocite, except at surface, where sometimes broken down to carbonates, and the ore is pockety. Development consists of only 122′ of tunnels, as all work is exceedingly expensive and there is no particular object in developing extensively until transportation facilities are secured. It is hoped to have mixed rail and water shipping facilities, early 1909, by a steamer on the Chitina River, 24 miles to a railroad under construction. Management is good, and property is second only to the Bonanza mine in promise among all the copper properties of the Copper River district.

HOUGHTON CONCENTRATING CO. MICHIGAN

Office and works: Houghton, Houghton Co., Mich. Livingston Whitney, president; Geo. F. Chauncey, vice-president and treasurer; Alfred Schwartz, *agent*. Organized under laws of New York, practically as successor of Copper *Concentrating* Co., described Vol. VII. Property is the entire stock issue of

Manufacturing Co., which owns a lease of the Quincy sands, and described under title of latter-named corporation.

N DEVELOPMENT CO. **ARIZONA.**
Formerly at Bisbee, Cochise Co., Ariz. Fully described Vols. IV and V.

N GOLD & COPPER MINING CO. **ARIZONA.**
ffice: Jerome, Yavapai Co., Ariz. J. T. Whedon, president; Geo. vice-president; Geo. C. West, secretary and treasurer. Has a 100' to cut a 35' vein. Idle several years.

-ARIZONA COPPER CO. **ARIZONA.**
ffice: Wickenburg, Maricopa Co., Ariz. Wm. Owens, superintendrty is said to have 1,800' of workings.

COPPER CO. **MONTANA.**
Formerly at Philipsburg, Granite Co., Mont. Described Vol. VI.

COPPER CO.
451 Equitable Bldg., Baltimore, Md. Location of lands, if any,

MINING CO. **VIRGINIA.**
ffice: Virgilina, Halifax Co., Va. C. N. Howard, general manager. de the Chappel mine, 10 miles from Virgilina, adjoining the High f the Virgilina Copper Co. on the northeast, also a gold property, niles north of Virgilina. Idle.

MINING CO. **ARIZONA.**
Lands sold, circa 1901, to American Copper Co. Formerly at Humpai Co., Ariz.

UND MINING CO. **BRITISH COLUMBIA.**
care of Moore & Schley, 50 Broadway, New York, N. Y. Mine e Sound, New Westminster district, B. C. Grant B. Schley, presinized under laws of Maine, with capitalization $2,000,000, shares Was planned as a holding company, to take over control of the Copper Syndicate, Ltd., and Britannia Smelting Co., Ltd. Apparf business.

A CONSOLIDATED DEVELOPMENT CO. **ARIZONA.**
Formerly at Palmerlee, Cochise Co., Ariz. Described Vol. VII.

MINERA HUACHUMACHAY. **PERU.**
ffice: Morococha, Junín, Perú. Organized 1900. Lands, 10 per- known as the Santo Domingo mine, opened by tunnel. The Crucero o veins, with practically vertical dip, cross diagonally, giving a on the Veta Crucero, which increased to width of about 20', carryraging about 15% copper and 2 kilograms silver per metric ton, ne gangue, the Veta Octavio being barren elsewhere. Production, 33,102 lbs. fine copper, secured with a force of 71 men.

MINERA HUACRACOCHA. **PERÚ.**
care of Dr. O. Valentine, general manager, Lima, Perú. Works rococha, Junín, Perú. Property is the Fundición Huacracocha, concentrator and smelter. The mill has 2 stamps, 2 Blake crushers, 2 Evans jigs, 1 classifier, 2 Frue vanners and 2 Wilfley tables. The mines from Morococha, on the shore of Lake Huacracocha, three miles, is of 75 tons daily capacity, with 1 reverberatory and 1 blast-furnaces, largest 30 tons. Has a 7' Pelton wheel and electric plant. Works run irregularly on custom ores. Idle.

A HUANCHACA DE BOLIVIA.
29 Rue de Londres, Paris, France. Mine office: Huanchaca de la Compañía, president; Marquis J. de Ballet, general manager, Huanchaca, Bolivia.

engineer; Segundo R. Nava, general secretary; Jorge Lewis, agent. Organized 1873, and reorganized 1891, under laws of Bolivia, with capitalization increased, 1877, and 1891, to 12,800,000 bolivars, shares 40 bolivars par, fully paid. In 1906 company earned a profit of 1,143,263 bolivars, and has paid considerable dividends.

Property is silver and copper mines, principal production being silver, though a little copper is produced from argentiferous tetrahedrite, at the company's smelter, and some copper is shipped. Company operates the Antofagasta & Bolivia railway, under lease, and has 600 miles of private telephone line.

The company has smelters at Pulacayo and Playa Blanca, latter, formerly leased by the American Smelting & Refining Co., apparently now idle. In 1907 the company shipped, to the Tacoma smelter, 1,600 tons of ore averaging 5% copper, 5% zinc and 50 oz. silver per ton, containing 160,000 lbs. fine copper.

SOCIEDAD DE MINAS i FUNDICIONES DE HUANILLOS. CHILE

Office: Santiago de Chile. Works office: Tocopilla, Antofagasta, Chile. Organized Nov. 28, 1905, under laws of Chile, with capitalization £200,000, shares £1 par. Has a smelter with blast and reverberatory furnaces, making ejes of about 47% average copper tenor. Production, 1903, was 245,085 lbs. fine copper.

HUBBARD-ELLIOTT COPPER MINES DEVELOPMENT CO. OF ALASKA. ALASKA

Office: 1115 Stock Exchange, Chicago, Ills. Western office: 411 New York Blk., Seattle, Wash. Mine office: Valdez, Prince William Sound district, Alaska. H. Curtis Elliott, president; H. P. Elliott, first vice-president and general manager; A. J. Elliott, secretary; John T. Evans, treasurer. Organized Jan. 6, 1904, under laws of Washington, with capitalization $1,500,000, shares $1 par. Controls, through ownership of 505,484 shares, the Knights Island Consolidated Copper Co.

Lands, 123 claims, area circa 2,500 acres, on Elliott Creek, an affluent of Copper River, interior Alaska, with 39 claims patented, and balance in process of patenting. Lands carry about 300 acres of timber, with an available water fall, rated as capable of developing 5,000 h. p. Country rock at the Elliott Creek mine, which is near the Bonanza mine, is greenstone, the contact carrying bunches of oxidized ores and chalcocite, with extreme horizontal length of 25', limited to a few yards in depth, and apparently no clearly defined veins have been found in place in this belt of slightly crushed greenstone. Company claims that this property shows 26 fissure veins averaging 20' to 60' width, 300' to 1,000' length and 1,100' depth. Depth claimed must be based on diamond drill borings, which were made circa 1905. Development is by the 190' Ely shaft and 3 tunnels. The Elizabeth tunnel is claimed to show 31' of 20% ore. The Ely tunnel is about 160' long and the mine has about 500' of underground workings, a pitifully small amount of work to show the 600,000 tons of ore claimed by the company to be blocked out for mining, which is claimed to average 28% copper, an excessive estimate. Company claims that ores have been shown to continue unaltered for depth of 200'. Line has been surveyed for a 17-mile tramway, of 1,000 tons daily capacity, to connect mines with the Copper River & Northwestern railway. Buildings include a smithy, carpenter-shop and 4 log cabins.

Apparently the company has devoted its recent efforts mainly to the development of the Knights Island Consolidated Copper Co. Claims of the company for its Elliott Creek property not only are excessive, but are under suspicion of being deliberately untruthful. Is not regarded favorably.

NING INVESTMENT CO. **ARIZONA.**
office: Benson, Cochise Co., Ariz. Property is the Valenzuela group, ncon Mountains, circa 25 miles northwest of Benson.

NIE DES MINES DE CUIVRE DE HUELVA. **SPAIN.**
. Formerly at La Granada, Huelva, Spain. Described Vol. VI.

D PYRITES DE HUELVA. **SPAIN.**
office: Calañas, Huelva, Spain. At last accounts property was in f development.

CENTRAL COPPER MINING CO., LTD. **SPAIN.**
. Succeeded, 1903, by Huelva Copper & Sulphur Mines, Ltd. For- Almonáster, Huelva, Spain.

COPPER & SULPHUR MINES, LTD. **SPAIN.**
s: 23 Courthope Road, London, N. W., Eng., and 17 Blvd. Haussmann, ance. Mine office: Cueva de la Mora, Almonáster, Huelva, Spain. he, chairman; Chas. Blanchot, managing director; preceding officers, hanoy, Maurice Dutreil, Maurice Gabet and Vicomte de Terron, di- . D. Collas, secretary; J. L. Croze, assistant secretary; Baron de , general manager. Organized Oct. 28, 1903, under laws of Great with capitalization £600,000, shares £1 par; issued, £486,487. Was y a reconstruction of the Huelva Central Copper Mining Co., Ltd. e listed on the Paris bourse.
s, 1,200 hectares, including the Monte Romero and Cueva de la Mora Has leased 27 hectares, to the Tharsis Copper & Sulphur Co., Ltd., on Lands lie between the Rio Tinto and Tharsis mines, in a favorable and are opened by the Monte Romero, Cueva de la Mora and San hafts.
ear 1907 mining profits were £63,177 10s., from which was paid a 1s. amounting to £24,324 7s., company ending the year with a balance of .

INDUSTRIAL CO., LTD. **SPAIN.**
: 22 Abchurch Lane, London, E. C., Eng. Wm. Keswick, M. P., Harold B. Milne, secretary. Organized Dec. 30, 1893, under laws of itain, with capitalization £100,000, shares £10 par, fully issued. Is as a close corporation, and apparently has some connection with the Co., Ltd.

NO GOLD & COPPER MINING CO. **COLORADO.**
office: Walsenburg, Huerfano Co., Colo. Organized 1902, under laws cky, to develop copper claims in the Ojo district. Idle.

COPPER, IRON & LEAD MINES, LTD. **SPAIN.**
. Formerly in province of Huesca, Spain.

PPER MINING CO. **MONTANA.**
: Wallace, Idaho. Mine office: Saltese, Missoula Co., Mont. Her- idemann, superintendent. Organized 1907, with capitalization , shares $1 par. Lands, 3 claims, lying immediately east of Saltese, 2 veins, which should be cut by tunnel at length of circa 850′ and pectively. Has a 200′ tunnel with a 50′ winze, showing ore carrying copper and $7 gold per ton.

D MINERA HUILLCA. **PERÚ.**
office: Morococha, Junín, Perú. Organized 1892. Lands, 3 per- , known as La Huillca and La Vieja mines. Production, 1904, was of 18% ore, yielding 166,491 lbs. fine copper. Employs circa 50 men.

COPPER MINES, LTD. **PERÚ.**
101 Leadenhall St., London, E. C., Eng. Mine office: Huaraz,

Ancachs, Perú. Col. D. Pedro Juárez, chairman; A. Ferguson, mana rector; Wm. Warren, mine manager. Organized May 9, 1904, under Great Britain, with capitalization £400,000, shares £1 par. Debentures, Lands, 256 hectares, circa 30 miles from Puerto Culebra, including t taña de La Plata mines, carrying argentiferous copper ores. Also has cite coal lands 15 miles from copper property. Has been building a for several years, and expected, at last accounts, to put same in bl ing 1908.

COMPAÑIA MINERA DE HUIRIÁCHIC. M

Mine office: Chalchihuites, Sombrerete, Zacatecas, Mex. John president; C. A. Phelps, treasurer and general manager, at last account are argentiferous and auriferous chalcopyrite and galena, developed b and tunnel. Presumably idle.

HULBERT MINING CO. MIC

Office: 199 Washington St., Boston, Mass. Mine office: Leopol Houghton, Houghton Co., Mich. Albert S. Bigelow, president; W Chrimes, secretary; Wm. J. Ladd, treasurer; Norman W. Haire, gener ager. Fred W. Nichols, agent. Lands, 1,598 acres, in Town 57 North 37 West; Town 56 North, Range 33 West, and Town 55 North, Range 3 Houghton county, Michigan. Lands are mainly undeveloped properti a considerable part of the surface rights has been sold, mineral rights been reserved by the company. Idle many years.

HULL COPPER CO. AR

Office: 1505 Real Estate Trust Bldg., Philadelphia, Pa. Min Jerome, Yavapai Co., Ariz. Hon. Geo. W. Hull, president and general m O. B. Stanton, vice-president; W. B. Hazeltine, treasurer; W. B. Wil retary; Capt. Wm. McDermott, general superintendent; J. W. Hubba superintendent. Organized 1906, under laws of Arizona, with capit $10,000,000, shares $1 par. Is said to have clear titles and no incum Apparently has no treasury stock, but it is understood that Mr. Hull 50% of profits of sales of stock to treasury, up to amount of $150,00 arrangement cannot be regarded as giving an adequate financial basis development of a mine. The O. B. Stanton outfit, as fiscal agents, circa 1907, to newspapers that would carry their advertisements, a 5 mission on all stock sales, showing that commissions were excessive.

Lands, 21 patented claims, area 249 acres, adoining on northw south the United Verde. Development is by the 1888 shaft, of 475', within 200' of the United Verde smelter, which has produced amount of ore. Principal development is by the Dillon tunnel, of abo length, which would connect with shaft at depth of about 3,850' fro providing the tunnel is continued and shaft sunk to the point of inte The Dillon tunnel is quoted as showing ore of 19 to 20% copper ten small gold and silver values, but has no body of commercial ore de despite the extremely optimistic claims made in advertisements, tho tunnel shows small bunches of ore at various points. Property has a about 7,000' of workings, and it is claimed that considerable good been proven by diamond drill cores, taken from the Hull lands by th Verde, but this statement does not seem fully verified.

Property is considered promising, being perhaps the most prom the developing mines in the United Verde district, and Mr. Hull h regarded personally; but the Stanton crew is viewed with deep susp utterly lost to all sense of truth, and company's advertisements claim *too much* on the strength of the United Verde, and hold out roseate p *to investors* that lack substantial foundation.

MBER CONSOLIDATED MINING & MANUFACTURING CO. NEWFOUNDLAND.

Office: 27 William St., New York, N. Y. Moribund. Formerly at York arbour, Newfoundland. Fully described Vol. V.

UMBOLDT-ARIZONA COPPER CO. ARIZONA.

Mine office: Humboldt, Yavapai Co., Ariz. Lands, 5 claims, near Humldt, having an 80' shaft.

UMBOLDT COPPER CO. MICHIGAN.

Office: 64-50 State St., Boston, Mass. Mine office: Copper Falls, Keweenaw Co., Mich. C. Howard Weston, president; John Brooks, secretary and treasurer; J. Wesley Clark, superintendent; preceding officers, W. C. Fisk and Wesley Watson, directors. Organized 1863, under laws of Michigan, and capitalization increased, later, to $1,000,000, shares $25 par. Amount paid in is ,000 in real estate and $240,986.76 in cash. Annual meeting, fourth Tuesday in March.

Lands are Sections 16 and 21, former fractional, Town 58 North, Range 31 West, all on the mineral belt, about midway between the Arnold and Phoenix mines, lying north of the greenstone, with the Eagle River and Natick mines to the south. The mine was opened 1853, but never was a producer. There is a single shaft, circa 300' deep, on the ashbed, which shows the same characteristics as at the Arnold, carrying occasional bunches of rich ground. Equipment includes an engine-house, compressor building, smithy, warehouse and 4 dwellings.

UMBOLDT COPPER CO. NEVADA.

Office: 618 Kohl Bldg., San Francisco, Cal. E. J. Miloy, president; C. C. Keating, Jr., vice-president; M. P. Danly, secretary; preceding officers, E. B. Grace and Dr. Geo. E. Ebright, directors. Organized under laws of Arizona, with capitalization $1,000,000, shares $1 par. Company asserts that it has 8 claims, on Jackson Mountain, Humboldt county, Nevada, connected by a good wagon road, with a railroad 60 miles distant. Property is claimed to have circa 1,000' of workings, showing a vein of 12' width at surface, widening to 74' in the lower tunnel, carrying ores that have assayed 15 to 16% copper, 3 to 5 oz. silver and $1.65 gold per ton. Company's business methods are devious.

UMBOLDT ORE CO. ARIZONA.

Mine office: Humboldt, Yavapai Co., Ariz. Capitalization presumably ,000. Is controlled, through ownership of practically entire stock issue, by Consolidated Arizona Smelting Co.

UMBOLDT SMELTER. ARIZONA.

Owned by Arizona Smelting Co.

UMBOLDT SMELTING & REDUCTION CO. NEVADA.

Dead. Was reorganized May 5, 1904, under laws of District of Columbia, with capitalization $500,000, shares $1 par. Property was sold, 1906, to Nevada Mining Co., Ltd. Officers were E. L. Labadie, president; G. A. Brevoort, secretary; preceding officers, Geo. Haldorn, C. E. Fish, A. S. Donald, R. W. McCormick, E. L. Freeman and P. T. Kretschmann, directors. Former office was 520 Tenth St., N. W., Washington, D. C. Formerly at Golconda, Humboldt Co., Nev.

BUG MINING CO. UTAH.

Mine office: Eureka, Juab Co., Utah. Ores carry gold, silver and copper. Idle and apparently moribund.

PHREY-ARIZONA GOLD-COPPER MINES CO. ARIZONA.

Letter returned unclaimed *from former mine office*, Wickenburg, Maricopa Co., Ariz. *Lands, near the Rio Tonto Copper Co.*, east of Wickenburg, *in the Picacho district, were being developed, 1907*, on a small scale. Idle.

HUNGARIAN COPPER CO. MIC

Dead. Wound up circa 1898 and lands sold to Oneco Copper Mi Formerly at Hancock, Houghton Co., Mich.

HUNT COPPER CO. NEW M

Office: Alamagordo, N. M. Mine office: Mountain Park, Ot N. M. Organized 1907. Lands, in the Highrolls district, 3 miles from tain Park, are said to show considerable sulphide copper ore.

HUNTERS CREEK MINING & MILLING CO. WASHI

Office: 1515 Masonic Temple, Chicago, Ills. Geo. W. Smith, pr M. L. Brain, secretary; Manson Rexford, treasurer. Lands, 20 cla Stevens county, Washington, claimed to show a vein of 18" to 40" assaying 17 to 20% copper. Company claims to have a 755' tunnel. Se Brain writes that a great injustice was done by the statement in Vol. the company was alleged by shareholders to be a fraud. The annual of the company is a curiosity, including the most remarkable financia ment ever seen by the Copper Handbook. Is in litigation, and is view suspicion.

HUNT MINING & MILLING CO. I

Office: 8 India St., Boston, Mass. Letter returned unclaimed from mine office, Weiser, Washington Co., Idaho. Idle some years and m

HURON GOLD CO. AR

Office and mine: Jerome, Yavapai Co., Ariz. Geo. W. Hull, pr treasurer and general manager; H. E. Wilcox, secretary. Organized laws of Arizona, with capitalization $1,000,000, shares $1 par. Lands, 5 area 80 acres, known as the Swindler mine, in the Big Bug district, h 125' shaft and 680' tunnel, with upwards of 1,000' of workings, showing up to 18' width, carrying ore giving assays of 2.5 to 11% copper and $ gold per ton. Is said to have 800 tons of ore on dump. Idle several ye

HURON MINING CO. WASHI

Office: Everett, Wash. Mine office: Darrington, Snohomish Co., Ores carry copper and gold values. Has water power. Idle several ye

HUSTON MINE. ON

Office: care of John J. Case, Morococha, Junín, Perú. Mine office: salon, Algoma, Ont. Lands, 1,400 acres, 15 miles north of Thessalon, a 60' vein, standing circa 40' high, traceable circa 3,000', with an streak carrying sulphide ore with quartz gangue, up to 8% in copper te but slightly developed. Idle since circa 1902.

HYATT-VERDE COPPER CO. COLO

Office and mine: Steamboat Springs, Routt Co., Colo. B. C. Hazel manager. Was developing, 1907, on a small scale.

HYDAH COPPER CO. AL

Office: care of Fred J. Eitel, president, Seattle, Wash. Mine offic permount, Prince of Wales Island, Alaska. J. A. Jackson, vice-pre Victor Vigelius, general manager; F. W. Crary, secretary; J. Albert J treasurer; C. H. Waters, superintendent. Organized 1906, under l Washington, with capitalization $60,000. Lands, known as the Ma group, are on the north side of Karta Bay, circa 2,000' from tidewat veloped by a 40x40' pit showing an ore body of 40' width, low in copp and carrying up to $2 gold per ton. Has a tunnel connecting with bins, which in turn has a 2,100' tramline running to ore bunkers on the at tidewater. Shipped some ore, 1907. Property considered promising.

HYPOCKA MINING CO. MON

Dead. Lands sold, 1906, to Butte Coalition Mining Co. Form *Butte, Silver* Bow Co., Mont.

THEEK MINING & MILLING CO. **IDAHO.**
ice: Wallace, Idaho. Mine office: Kingston, Shoshone Co., Idaho. Guay, president; Walter J. Bracking, vice-president; Norman Ebbley, manager; Abraham Wyman, secretary; B. S. Knudson, treasurer; pre- officers, Frank Guay, C. W. Wingate and A. H. Conner, directors. nds show 3 veins, two of 10′ to 20′ estimated width, and one, known Great Western, under development, which is opened by a 180′ blind from the breast of a 700′ tunnel, showing a vein of 8′ to 25′ width, with to 18″ paystreak carrying native copper and cuprite, said to average in tenor, and chalcopyrite assaying up to 16% copper, balance of vein ug low grade ore estimated at 2% copper, with small gold and silver . Property also shows galena, apparently undeveloped. Equipment in- a 65-h. p. boiler, 10-h. p. hoist, 5-drill air-compressor and a sawmill.

EDAD COLECTIVA IBARRA HERMANOS. **SPAIN.**
fice: Sevilla, Spain. Mine office: Cortegena, Huelva, Spain. José Luis , manager. Property is the San Telmo group of 29 old mining claims, 22 hectares, carrying cupriferous iron pyrites.

PLOMOSA MINING CO. **ARIZONA.**
ffice: Yuma, Ariz. Mine office: Bouse, Yuma Co., Ariz. Thos. L. in president; H. H. McPhaul, vice-president; Wm. C. DeSpain, secretary reasurer; preceding officers, J. L. DeSpain and J. D. Marrs, directors. ized 1907. Lands, circa 30 claims, and 28 claims said to have been , early 1908, in the Plomosa Mountains, 12 miles south of Bouse, show- idized ores of high copper tenor, carrying up to $4.50 gold per ton.

OCLAST CONSOLIDATED MINES CO. **WASHINGTON.**
ffice: 412 Berlin Bldg., Tacoma, Wash. Mine office: Keller, Ferry Co., J. R. Turner, president; C. E. Peterson, secretary; Alexander Mc- rs, superintendent. Organized 1902, under laws of Washington, with lization $2,500,000, shares $1 par, as a merger of Alliance Copper Mining d Iconoclast Gold & Copper Mining Co.
ands, 7 claims, area 115 acres, circa 2 miles north of Keller, showing 3 t deposits, one claimed by company to be 150′ wide and to carry chal- te assaying 5% copper, 2 oz. silver and $5 gold per ton, which is a s overestimate all around, property apparently having an ore body up in width, giving average assays of 3.6% copper and 2 oz. silver per ith some gold. Development is by a 325′ main shaft, and 3 tunnels with d aggregate length of 514′, longest tunnel apparently being 120′ only. asoline power. Resumed work, early 1907, after a period of idleness. ntly idle again.

CLAST GOLD & COPPER MINING CO. **WASHINGTON.**
ad. Absorbed, 1902, by Iconoclast Consolidated Mines Co. Formerly er, Ferry Co., Wash.

CONSOLIDATED COPPER CO. **IDAHO.**
ice: Newcastle, Pa. Mine office: Grangeville, Idaho Co., Idaho. J. Cunningham, president; Irvin E. Rockwell, manager. Lands, on the River, have a 700′ tunnel, showing ore assaying up to 15% copper, ilver and $2 gold per ton. Equipment includes an 800-h. p. hydro-elec- tallation and a 200-ton mill, in 2 units, one dry and one wet, the dry having Sutton & Steele dry tables, while the wet section is equipped Tilfley tables, Callow screens and tanks.

CONSOLIDATED COPPER MINES CO. **IDAHO.**
ad. Was a bit of stock-jobbery. Formerly at Decorah, Washington ho.

CONTINENTAL MINE. **IDAHO.**
ne office: Priest River, Bonner Co., Idaho. Lands, north of the Priest

Lake Mining Co., are opened by tunnel, showing ores carrying values main in silver-lead, with some copper.

IDAHO COPPER CO. IDAH

Office: care of John H. Nordquist, Wallace, Idaho. Mine office: Coe d'Alene, Kootenai Co., Idaho. Lands adjoin the Reindeer mine, extension vein of which is being sought by tunnel.

IDAHO COPPER MINES CORPORATION, LTD. IDAH

Office: 1906-74 Broadway, New York, N. Y. Thos. Greenwood, manage N. S. Edwards, consulting engineer. Location of lands in Idaho, if any, u known.

IDAHO COPPER MINING CO., LTD. IDAH

Mine office: Wallace, Shoshone Co., Idaho.

IDAHO COPPER MINING & SMELTING CO. IDAH

Dead. Formerly in Idaho county, Idaho. Described Vol. VII.

IDAHO MILLING CO. IDAH

Dead. Formerly at Doniphan, Blaine Co., Idaho.

IDAHO REDUCTION CO., LTD. IDAH

Office: Corcoran Bldg., Washington, D. C. Letter returned unclaim from former mine office, Weiser, Washington Co., Idaho. Works office: Clark ton, Asotin Co., Wash. Geo. A. Rahm, president; C. F. Drake, vice-presiden F. S. Bright, secretary; John Sennett, treasurer; preceding officers and Fairfield, directors. Organized 1903, with capitalization $1,000,000, shares par. Said to plan removal of smelter, on account of high price of fuel. Pr sumably idle.

IDAHO SMELTING & REFINING CO. IDAH

Office: Rookery Bldg., Spokane, Wash. Mine office: Sand Point, Bo ner Co., Idaho. J. Herbert Anderson, president; C. C. Titus, general ma ager. Organized circa 1907, with capitalization $2,000,000, as a reconstru tion of the Panhandle Smelting Co. Has authorized a $500,000 issue of 6 bonds. Indebtedness of old company, amounting to circa $217,000, was sumed by the new corporation.

Lands include the Venezuela group of claims, slightly developed, on t southeastern shore of Lake Pend d'Oreille, carrying silver-lead ores.

The 200-ton reduction plant, known as the Panhandle or Ponderay smelt on Lake Pend d'Oreille, is primarily a lead plant, though capable of handli copper ores also. Equipment includes four 60-ton roasters. There is a wha and the company owns a small steamboat.

The smelter was blown in circa June, 1907, and blown out shortly ther after, ostensibly owing to lack of sulphide ores for fluxing. The smelter w again blown in Oct. 20, 1908, with a force of circa 75 men, and is planne to do a general custom smelting business, more especially on silver-lead ore and is being managed under the advice of the Montana Mineowners' Associa tion, which furnishes moral support and has promised to furnish ore. The has been talk of increasing the capacity of the plant, but this is prematur as the works should first demonstrate their ability to operate profitably.

IDAHO & SPRING GULCH MINING & MILLING CO., LTD. MONTANA

Office and mine: Mullan, Shoshone Co., Idaho. F. Carson, president a general manager; Andrew Swanson, vice-president; R. A. M. Vitty, secre tary; Wm. Coumerlh, treasurer. Organized Oct. 30, 1906, under laws of Idah with capitalization $1,000,000, shares $1 par; issued, circa $850,000.

Lands, 7 claims, 1 fractional, area circa 110 acres, well timbered, b tween the Little Pittsburg and King and Queen mines, in an unorganize district near Carter, Missoula Co., Mont. Property shows porphyry, slat *limestone*, carrying 2 ore bodies, of which one, under development of 6' *mated average* width, traceable 2,000', is estimated to average 6% copper a

oz. silver per ton, mainly from gray copper ore. There also is a parallel vein, carrying silver-lead ore. Development on the copper vein is by shafts of 50′ and 300′, and tunnels of 60′ and 700′, longer being planned to be driven 1,700′, to cut both copper and lead veins. The upper tunnel shows malachite and azurite, assaying circa 7% copper, 1.4 oz. silver and 1 to 6 oz. gold per ton. Mine has 3 small buildings and is circa 3 miles from the Montana and Northern Pacific railroads.

IDA MONTANA DEVELOPMENT CO. **MONTANA.**

Dead. Was organized June 6, 1906, under laws of Arizona, with capitalization $800,000, shares $10 par, and reorganized circa August, 1907, as Ida Montana Mining Co. Formerly at Butte, Silver Bow Co., Mont.

IDA MONTANA MINING CO. **MONTANA.**

Office: Calumet, Mich. Mine office: Butte, Silver Bow Co., Mont. P. D. MacNaughton, president; Capt. Jas. W. Milligan, vice-president and mining director; Wm. J. McDonald, secretary; Jos. W. Selden, treasurer; M. J. McEvans, superintendent; preceding officers, Wm. H. Thielman, F. P. Rugee, Victor Nordberg, Edward Ulseth, Angus McDonald and Jeremiah E. O'Neil, directors. Organized 1907, under laws of Arizona, with capitalization $1,000,000, as a reconstruction of the Ida Montana Development Co.

Lands, 3 claims, known as the Ida, A and B, near the Amazon-Butte, across the valley and about 1½ miles southeast of Butte, just south of Columbia Gardens, said to have been bought for $175,000, and to be fully paid for.

The property had 2 old shafts, of 115′ and 118′, one of which, known as No. 3, has been cut down to 3-compartment size, and sunk to 480′ depth, and is planned to be sunk 1,000′. This shaft shows, on the 250′ level, copper sulphides carrying silver and gold values of commercial grade, and a little ore was shipped, 1908, by leasers.

Equipment includes a hoist good for 1,500′, from the Baltic mine, and a 20-drill air-compressor, with several small mine buildings. Property employed circa 50 men, late 1907, but was attached December, 1907, in 3 actions, for supplies furnished. Apparently the indebtedness has been liquidated, and, late 1908, company planned early resumption. Management includes some strong and experienced mining men, but property lies outside the proven ore zone of Butte.

IDEAL MINING CO. **UTAH.**

Office: care of Newton A. Dunyon, president, Salt Lake City, Utah. Mine office: Milford, Beaver Co., Utah. Wm. M. Bradley, vice-president; W. T. Atkin, secretary and treasurer; preceding officers, C. M. Strevell and J. H. Paterson, directors. Property adjoins the Burning Moscow mine. Presumably idle.

IDEAL MINING & DEVELOPMENT CO. **ARIZONA.**

Office: 38 Wall St., New York, N. Y. Mine office: McCabe, Yavapai Co., Ariz. Cecil G. Fennell, general manager; M. J. Enright, superintendent Gladstone mine; Jas. O'Brien, superintendent Model mine.

The Gladstone mine has a 1,000′ shaft, with auriferous and argentiferous copper and lead ores, values being mainly in gold. Equipment includes an electric pump, on the 800′ level, handling 20,000 gallons daily, a 120-h. p. Sandrie & Bolthoff hoist, capable of raising 3-ton loads from 1,500′, and a 10-drill Ingersoll-Sergeant air-compressor, all electrically operated by a Crocker-Wheeler motor. The Gladstone ships high grade ore, and runs concentrating ore through the McCabe mill.

The Model mine, 6 claims, formerly known as the McCabe, bought, circa 1906, for $81,521, has a 750′ incline shaft, with about 12,000′ of workings, showing several ore bodies carrying 8″ to 10″ of smelting ore, and 12″ to 24″ of milling ore, former with combined gold, silver and copper values of $35

to $85 per ton, and latter carrying about 2% copper, with small gold and ver values. Country rock is granite, with numerous intrusive porphyry dik granite being much shattered. Oxidized zone is only about 40' deep, follow by auriferous and argentiferous copper, lead and zinc sulphides.

The McCabe, or Model mill, has 10 stamps, a 50-ton Elspass mill, 1 W fley and 3 Standard tables. Production, 1906, was 518,895 lbs. fine copp 139,766 oz. silver and 14,696 oz. gold, of the total value of $497,152. Produ tion, 1907, was 361,257 lbs. fine copper, 117,582 oz. silver and 12,004 oz. go

IKONOMOFF CESSION. BULGARI

Office: care of M. Dimitri Ikonomoff, owner, Hotel Boulevard, Sofia, B garia. Mine office: Kara-Baïr, Bourgos, Bulgaria. Lands, slightly develope are held as a cession from the principality. Idle.

IKUNO MINE. JAPA

Owned by Mitsu Bishi Goshi-Kwaisha.

ILION MINING CO. UTA

Mine office: Bingham Canyon, Salt Lake Co., Utah. Lands, 2 claim known as Grand Cross and Rough & Ready. Idle some years.

ILLINOIS COPPER MINING CO. WYOMIN

Office: 862 Monadnock Blk., Chicago, Ills. Mine office: Encampme Carbon Co., Wyo. Geo. H. Miller, president and general manager; N. V. Mallory, secretary and treasurer; A. H. Oldman, superintendent. Organiz 1899, under laws of Wyoming, with capitalization $1,000,000, shares $1 p Lands, 9 claims, area 185 acres, in the Upper Platte district, near the Colora line, showing 3 contact veins, principal said to be 18' wide, 50' deep and 4,5 long, carrying chalcocite, with quartz gangue, assaying 14 to 27% copper, oz. silver and $4 gold per ton, which is excessive. Has 3 shafts, deepest Was working a small force early in 1907.

ILLINOIS COPPER MINING & MILLING CO. WASHINGTO

Letter returned unclaimed from former mine office, Republic, Ferry C Wash. Is said to have 40' vein, opened by a tunnel showing copper ore commercial grade.

ILLINOIS GOLD & COPPER MINING CO. MEXIC

Dead. Formerly at Pánuco de Monclova, Coahuila, Mex.

ILLINOIS-JALISCO MINING CO. MEXIC

Office: 213 South Sixth St., Springfield, Ills. Mine office: Ayutla, Autla Jalisco, Mex. E. A. Perry, president; Homer Vandevender, vice-president; Th Montgomery, secretary; J. T. Ash, treasurer; preceding officers and Geo. Gibbons, directors; John Breckenridge, general manager. Capitalizat $1,000,000, shares $1 par; issued, $750,000.

Lands, 45 hectares, including El Crudo and El Bajio mines, latter a antigua. Property is said to show 15 veins, with 6 under development, ma vein being 8' to 17' in width, traceable 2 miles. El Crudo shaft, of 225' depth shows ore of 5 to 20% copper tenor, estimated to average 5% copper, 15 silver and $5 gold per ton. Mine has about 3,000' of workings, estimated show circa 50,000 tons of ore.

Company plans a 500-h. p. hydro-electric installation, mining equipme and building a concentrator. Employs circa 75 men.

ILLINOIS & JEROME COPPER CO. ARIZONA

Mine office: Jerome, Yavapai Co., Ariz. A. D. Zallanack, president; Fre H. Gorham, vice-president; Annie E. Zallanack, secretary and treasurer; pr ceding officers are the directors. Organized circa August, 1908, with cap talization $1,000,000, shares $1 par. Lands are near the Copper Chief.

ILLINOIS MEXICAN COPPER CO. MEXIC

Office: 15 Broad St., New York, N. Y. Mine office: Ayutla, Autl

lisco, Mex. L. C. Frey, manager. Organized 1906, with capitalization 00,000. Presumably idle.

INA ILUSION. **CHILE.**

Mine office: Talcuna, La Serena, Coquimbo, Chile. Victor Illanes, owner nd manager. Property, 16 kilometers from Marquesa railway station, shows vein of about 12′ average width, and, in 1903, with a force of 16 men, roduced about 400 metric tons of ore of about 9% average copper tenor.

MA CONSOLIDATED MINING & MILLING CO. **IDAHO.**

Dead. Formerly at Patterson, Lemhi Co., Idaho. Described Vol. VI.

MLAY COPPER MINING CO. **NEVADA.**

Office: Salt Lake City, Utah. Mine office: Humboldt House, Humboldt ., Nev. Geo. W. Morgan, president; R. E. Siddoway, secretary; preceding fficers, Jos. Lippman, Sidney M. Bamberger, F. M. Smith and O. W. Powers, irectors; J. R. Turner, superintendent. Changed name, early 1907, from Iorrison Mining Co. to present title, and increased capitalization to $5,000,000.

Lands, 26 claims, unpatented, 2 millsites and a townsite, circa 5 miles rom Humboldt House. Mine has 250′ incline shaft, with circa 1,500′ of work-ngs, showing ore assaying up to 8.8% copper, 7.6% lead and 0.18 to 66.5 oz. old per ton. Equipment includes two 60-h. p. boilers, a hoist and several mall buildings. A concentrator is planned. Begun shipments circa April, 08, to the Selby smelter, shipping one carload weekly, of ore running $50 to 00 per ton in values. A mill is planned. Property considered promising.

MPERIAL COPPER CO. **ARIZONA.**

Dead. Formerly at Wickenburg, Maricopa Co., Ariz. Described Vol. III.

MPERIAL COPPER CO. **ARIZONA.**

Office: 1408-11 Pine St., New York, N. Y. Operating office: Tombstone, riz. Mine office: Silver Bell, Pima Co., Ariz. E. B. Gage, president; W. F. tanton, vice-president and general manager; A. N. Gage, secretary and reasurer; preceding officers, Selwyn Eddy, V. L. Mason and H. M. Robinson, irectors; David Morgan, mine superintendent; C. C. Klingerman, railroad uperintendent; S. F. Shaw, engineer; J. C. Woodworth, mine foreman.

Organized May 15, 1903, under laws of Arizona, with capitalization 0,000,000, shares $10 par. Bonds, $2,000,000 authorized, at 6%. Is con-olled, through ownership of practically entire stock issue, by Development o. of America. Apparently controls, through ownership of practically entire ock issue, the Southern Arizona Smelting Co., though latter-named corpora-n may be controlled by the Development Co. of America. Paid 2% divi-nds, April, 1906, and January and April, 1907, but suspended dividends on ccount of the depression in the copper market. Net earnings, for fiscal year nding March 31, 1908, were $220,129. Fiscal year has been changed to end eptember 30. Annual meeting, second Tuesday in November.

Lands, 60 claims, mostly patented, area circa 1,000 acres, also a 640-acre illsite at Red Rock, with total holdings of about 3,000 acres, in the Silver ell Mountains, a small independent range having a granitic base, with uestone and quartzite capping, latter much eroded and entirely gone at ny points. There has been much faulting and shearing, ore bodies occur-g as irregular contact lenses, having a northwesterly strike, with axes rallel to fault and fissure planes. The granite-porphyry in the vicinity of lenses is strongly mineralized with copper sulphides. The eruptive dioritic es are highly altered, and the ore bodies carry strong gossans. The oxidized e is comparatively shallow, being not deeper than 150′ in the principal rkings, with a sharp change from the oxidized to the base zone. The dized ores are mainly cuprite, malachite and azurite, with furnished the t of past production, while the sulphide ore is mainly chalcopyrite, with asional bornite. The mines also show some cupriferous silver-lead ore,

much of which is an intimate mixture of galena, sphalerite and chalcopyrite decidedly difficult of satisfactory reduction. Ores mined, 1905, were reported to average 9.08% copper, 1.2 oz. silver and 12 cents gold per ton.

Property includes the Old Boot mine, now known as the Mammoth, opened circa 1865, which was a small producer, at irregular intervals, of high grade copper and silver-lead ores, under former ownership. This mine is opened by the 2,000′ Page crosscut tunnel, and by the Mammoth and Union shafts, to depth of circa 800′, with upwards of 6 miles of workings. The old Mammoth incline shaft, of 400′ depth, was replaced by a new 2-compartment vertical shaft, the old shaft now being used solely for ventilation and pump-columns.

Equipment includes a power plant with six 70-h. p. boilers, burning petroleum, with oil storage tanks, and 5 hoists, of 12-h. p. to 200-h. p. each, largest having 14x18″ cylinders, being good for 2,000′ depth. There are 10-drill and 15-drill 2-stage Norwalk straight-line air-compressors, and a Nordberg cross-compound condensing air-compressor, with piston efficiency of 3,000 cu. ft. free air per minute.

Buildings include 20x30′ and 30x80′ machine shops, of wood, sheathed with corrugated iron, a 36x40′ carpenter shop, a framing-mill, an 18x50′ smithy, bunk-houses, boarding-houses, changing-houses and about 20 dwellings, with a 3-story mine store, carrying a large stock. There also is an electric light plant.

The 300-ton concentrator, completed September, 1908, is said to have cost circa $165,000. There also is a 20x40′ experimental mill, of 10 tons daily capacity.

The Arizona Southern railway, 21 miles long, from Silver Bell to Red Rock, where connection is made with the Southern Pacific, is of standard gauge, and was built by the company. Equipment includes 2 locomotives and 5 cars.

The smelter, at Sasco, 8 miles south of Red Rock, is described separately under title of its owner, the Southern Arizona Smelting Co.

About 300 men are employed, mainly Mexicans, at average wages of $2 per day.

Production has been as follows: 3,030,630 lbs. fine copper in 1904; 5,687,152 lbs. in 1905; 4,385,246 lbs. in 1906; 5,267,401 lbs. fine copper and 63,170 oz. silver in 1907. For fiscal year ending March 31, 1907, production was 38,072 tons of ore, yielding 4,275,090 lbs. fine copper and 48,252 oz. silver; and for fiscal year 1908 output was 49,205 tons of ore, yielding 5,740,975 lbs. fine copper and 67,701 oz. silver. For first half of 1908 copper is said to have been produced for 10.68 cents per pound. Until Feb. 1, 1908, when the Sasco smelter was blown in, all ore was shipped to outside smelters. Copper is sold by the American Metal Co., Ltd., under a 3-year contract. Production, 1908, should show a very large increase, owing to increased productive capacity of the mill and smelter, and the company plans making 12,000,000 to 15,000,000 lbs. fine copper yearly. The property is well managed and is considered exceptionally promising.

IMPERIAL COPPER CO. ONTARIO.

Dead. Formerly at Parry Sound, Parry Sound district, Ont.

IMPERIAL COPPER & GOLD MINING CO. WYOMING.

Office: 219 Germania Bldg., Milwaukee, Wis. Letter returned unclaimed from former mine office, Encampment, Carbon Co., Wyo. Lands, 160 acres, near the Portland mine, on Upper Cow Creek, 12 miles west of Encampment, claimed to show 2 veins, 1 with width of 26′ to 32′ being a schist dike, has about 400′ of workings, showing ore assaying 6 to 14% copper. Idle several *years,* except for selling stock.

ERIAL COPPER MINING CO. **CALIFORNIA.**
Dead. Formerly at Pollasky, Fresno Co., Cal. Described Vol. VI.

'ERIAL COPPER MINING CO. **UTAH.**
Dead. Formerly at Frisco, Beaver Co., Utah.

'ERIAL CORONA GOLD MINING CO. **IDAHO.**
Office: 67 Wall St., New York, N. Y. Lost lands, 1908. Stock of El greso Copper Mining Co. was exchanged, December, 1905, for stock in this cern. Apparently merely a bit of stock-jobbery. Formerly at Elk City, ho Co., Idaho.

'ERIAL GOLD & COPPER MINING CO. **UTAH.**
Dead. Lands sold June 10, 1907, to Nevada-Utah Mines & Smelters Cor- ration. Formerly at Frisco, Beaver Co., Utah.

'ERIAL MINING CO. **IDAHO.**
Mine office: Burke, Shoshone Co., Idaho. Henry Billberg, president; mer G. Brown, secretary; John H. Nordquist, general manager. Organized 0, with capitalization $1,000,000, shares $1 par. Lands, near the Copper ng, have about a quarter-mile of tunnels. Plans a new 3,000′ tunnel.

MPERIAL MINING CO. **WASHINGTON.**
Office· Marysville, Wash. Mine office: Silverton, Snohomish Co., Wash. n E. Dupree, president. Lands, 11 claims, showing a contact vein between nite and conglomerate, carrying gold, silver, copper and lead ores. Idle veral years.

MPERIAL MONTANA COPPER MINING, SMELTING & WATER POWER CO. **MONTANA.**
Dead. Reorganized, 1904, as Bornite Copper Co. Formerly at Blackfoot, ton Co., Mont. Described Vol. V.

MPERIAL PAINT & COPPER CO. **CALIFORNIA.**
Mine office: Spenceville, Nevada Co., Cal. Mine is developed open-cast, d has steam power. Idle.

MPERIAL STATE MINING & MILLING CO. **NEVADA.**
Office: care of A. C. Rector, secretary, Los Angeles, Cal. Letter returned laimed from former mine office, Searchlight, Lincoln Co., Nev. U. S. G. ld, president. Organized under laws of Arizona, with capitalization 0,000, shares $1 par. Lands, 6 claims, also a 5-acre millsite and a water ht, having tunnels of 35′ and 265′ showing ore said to give average assays above 10% copper and about $90 gold per ton, which figures seem excessive. and apparently moribund.

MPERIO COPPER CO. **MEXICO.**
Office: Tucson, Ariz. Lands were said to be near Imperio, Sonora, xico, which is not a postoffice, and seems non-existent.

MPAÑIA MINERA INCA DE ORO i COBRE DE COPIAPÓ. **CHILE.**
Office: Iquique, Chile. Mine office: Copiapó, Atacama, Chile. Organized . 14, 1906, under laws of Chile, with capitalization £30,000, shares £1 par.

CA MINING & MILLING CO. **IDAHO.**
Office: Colfax, Idaho. Mine office: Cuprum, Washington Co., Idaho. perty is the Mineral World mine, carrying auriferous and cupriferous sil- lead ores. Idle.

DEPENDENCE COPPER & GOLD MINING CO. **UTAH.**
Office: care of E. O. Leatherwood, secretary-treasurer, Salt Lake City, h. Mine office: Alta, Salt Lake Co., Utah. Chas. Park, president; E. Morgan, general manager. Organized 1904, with capitalization $50,000, es 10 cents par. Lands, 7 claims, in the Little Cottonwood district. Idle ral years.

INDEPENDENCE COPPER MINING & SMELTING CO. ID

Dead. Merged, November, 1905, in Bonanza Mining Co. Former Montpelier, Bear Lake Co., Idaho.

INDEPENDENCE DEVELOPMENT CO. ARIZ

Office: 1525 Western Ave., Los Angeles, Cal. Letter returned uncla from former mine office, Globe, Gila Co., Ariz. Col. Thos. E. Farrish, dent; Chas. J. Hall, secretary and treasurer; Chas. Kumke, superinten Wm. Sultan, receiver. Organized Oct. 22, 1906, under laws of Arizona, capitalization $1,500,000, shares $10 par.

Lands, on Lyons Fork of Mineral Creek, 4 miles from the Gibson show Pinal schist, with fissure veins of copper ore, mainly sulphide, carr considerable silver and gold values. Lands show 3 practically parallel fiss and considerable ore of 5 to 25% copper tenor has been blocked out. Has s power. Shipped circa 400 tons, February, 1908, to the Old Dominion sme securing good average returns in copper, gold and silver. Property consid promising, but finances in a bad way.

INDEPENDENCE GOLD, COPPER & IRON MINING CO. CALIFOR

Dead. Formerly at Lavic, San Bernardino Co., Cal.

INDEPENDENCE MINE. MONTA

Mine office: Kalispell, Flathead Co., Mont. Property, on the Tob plain, is claimed to show a 25′ vein giving average assays of 8% copper $4 to $10 gold per ton, which is obviously a serious overestimate. Idle several years.

INDEPENDENCE MINING CO. COLORA

Mine office: Turret, Chaffee Co., Colo. Has auriferous copper ores, steam power. Presumably idle.

INDEPENDENCE MINING CO. IDA

Mine office: Mullan, Shoshone Co., Idaho. Lands adjoin the Co King mine, on the east, and give a promising surface showing. Idle, ground is being developed by a tunnel driven by the Missoula Copper Co.

INDEPENDENCE MINING CO. WYOMI

Office: 55 High St., Oshkosh, Wis. Mine office: Dillon, Carbon Wyo. Employs 16 men. E. E. Meilins, president; Henry L. Larsen, president; H. O. Granberg, secretary, treasurer and general manager; E. Sanders, superintendent. Organized June 28, 1904, under laws of Wyom with capitalization $1,000,000, shares $1 par, as successor of Leighton-Ge Mining Co.

Lands, 6 claims, patented, area 120 acres, in the Battle Lake dist showing eruptive metamorphic country rocks, carrying an 11′ contact between quartzite and diorite, opened by a 200′ shaft and 250′ tunnel, s ing occasional stringers of 3″ to 12″ width, carrying a little chalcopyrite as ing 12% copper, with small quantities of nickel and cobalt and traces of ver and gold. Has steam power, hoist and several small mine buildings. pany reports having a smelter with a 60-ton MacDonald blast-furnace.

INDEPENDENCE MINING & SMELTING CO. MEXI

Letter returned unclaimed from former office, St. Paul, Minn. Mine o Guachinango, Mascota, Jalisco, Mex. Chris. D. O'Brien, Jr., manager. has a 300′ shaft and a 370′ tunnel, showing argentiferous copper ore. H 50-ton smelter.

INDEPENDENT COPPER MINING & MILLING CO. IDA

Office: Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. Bean, president; John H. Nordquist, vice-president and manager; C. D. M treasurer; preceding officers, Henry Billberg, D. F. Clark, R. R. McCorm *August Matt*, and H. Leithead, directors. Capitalization increased, 190

0. Lands, near the Snow Storm, have a 786′ tunnel, showing seams r carbonates and impregnations of chalcopyrite.

ENDENT MINING CO. **WASHINGTON.**

ce: 705 First Ave., Seattle, Wash. Mine office: Baring, King Co., Edward Peterson, agent. Lands, sundry claims, on the north fork of Creek, Kittitas county, Washington, claimed by company to show s of galena, 2 gold veins, 1 cobalt vein, and an asbestos deposit, one in being asserted to be 30′ to 70′ wide. The company claims too much performed too little. Apparently moribund.

EDUCTION CO. **MEXICO.**

rks office: Indé, Durango, Mex. Is said to have a smelter, known as a. Presumably idle.

-BORNITE COPPER MINING CO. **WASHINGTON.**

ice: 36 Dexter Horton Bldg., Seattle, Wash. Mine office: Index, ish Co., Wash. A. M. Watt, secretary, treasurer and general manager. 2 claims, area 40 acres, 3 miles east of Index, having a 50′ shaft and of 70′ and 300′, lower tunnel showing a 2′ to 4′ vein with paystreak g argentiferous bornite assaying 16 to 50% copper and 6 to 8 oz. silver a. Was developing at last accounts.

INDEPENDENT MINING CO. **WASHINGTON.**

ad. Lost lands, Jan. 1, 1905. Formerly at Index, Snohomish Co., Wash.

MINING CO. **WASHINGTON.**

fice: Snohomish, Wash. Mine office: Index, Snohomish Co., Wash. ilbur, president and general manager. Lands, 5 claims, known as the group, opened by tunnels of 300′ and 800′, showing chalcocite, bornite alcopyrite, in a 12′ vein of concentrating ore carrying a 2′ paystreak lting ore, on the footwall. Idle.

NA-ARIZONA MINING CO. **ARIZONA.**

ad. Succeeded circa 1906, by Indiana-Arizona Development Co. For- at Silver Bell, Pima Co., Ariz.

NA COPPER CO. **MICHIGAN.**

ice: Houghton, Mich. Mine office: Rockland, Ontonagon Co., Mich. Edwards, R. C. Pryor, J. H. Rice, Dean Robinson and Frank McM. Stan- rectors. Organized 1862, under laws of Michigan, with capitalization 0, shares $25 par. Control was bought, circa 1907, from John R. Stan- l others, by present management. Lands, 1,280 acres, in Sections 21, 28, Town 50 North, Range 37 West. Assessments paid, $178,708. Mill rned, 1864, and property since idle. Lands presumably carry the ex- of the amygdaloid bed now being opened by the Lake Copper Co., and y will be explored therefor.

NA COPPER CO. **WYOMING.**

ne office: Holmes, Almany Co., Wyo. Lands, 6 claims, near the Ram- ne. Idle some years and apparently moribund.

NA-DARRINGTON MINING CO. **WASHINGTON.**

ce: care of Jas. G. Givens & Co., 405 Bailey Bldg., Seattle, Wash. ffice: Darrington, Snohomish Co., Wash. G. A. Rochester, president; . Crawford, secretary. Capitalization $1,000,000, shares $1 par. Pre- idle.

NA DEVELOPMENT CO. **ARIZONA.**

d. Reorganized, circa 1906, as Indiana-Arizona Development Co. For- t Silver Bell, Pima Co., Ariz.

NA MINING CO. **OREGON.**

ce: 25 Beeker Bldg., Anderson., Ind. Operating office: Baker City, ine office: Medical Springs, Baker Co., Ore. John W. Messner, presi- l general manager; *J. W. McAlpine, vice-president*; Dr. W. H. Staplish,

treasurer; Dr. A. A. Cleaver, auditor; W. L. Myers, superintendent; preced officers, E. E. Cleaver, G. F. Aldrich, Henry Schies and Wm. Godejohann, rectors; W. G. Drowley, secretary. Organized June 18, 1903, under laws Oregon, with capitalization $1,500,000, shares $1 par.

Lands, 14 claims, also a 280-acre townsite, on Big Creek, circa 25 mi east of Baker City, in the foothills of Powder Mountains. Property sho strong outcrops, and has a contact deposit between porphyry and greenst carrying auriferous and argentiferous copper sulphides with quartz gang averaging 2 to 3% copper, with occasional ore of higher grade. Developme is by a tunnel, which has not reached the ledge, and a 2-compartment 3 shaft, with 3 levels opened, and about 2,000′ of workings, said to show 2 bodies, one of 55′ and one of 10′ width, carrying 3.5 to 5% copper, and cir $3 gold per ton.

Equipment includes a Leyner hoist, good for 1,000′ depth, a 4-drill Ley air-compressor, 8 power drills and a small electric light plant. There about 10 buildings, including a 40x70′ shafthouse, 40′ high, a 16x30′ of and a boarding-house. A precipitation plant has 7 tanks, each 4x4x3′. M was said, September, 1907, to have circa 20,000 tons of ore on the du mainly broken in development, which probably is an excessive estimate. Pr erty is considered promising. Idle.

INDIANAPOLIS COPPER MINING CO. WYOMIN

Dead. Formerly at Riverside, Carbon Co., Wyo.

INDIANA-SONORA COPPER & MINING CO. MEXIC

Office: 99 John St., New York, N. Y. Mine office: La Cananea, Ariz Sonora, Mex. Prof. Jas. Douglas, president; Geo. Notman, secretary a treasurer; preceding officers, Cleveland H. Dodge, Arthur C. James, S. Esterbrook, N. J. McGowan and Dr. Henry Jameson, directors; Walter Do las, general manager; G. W. McBride, superintendent; T. H. Wiggins, gineer.

Organized November, 1900, under laws of West Virginia, with capitali tion $5,000,000, shares $10 par; issued, $3,700,000. For 1906 expenditures wer $40,901 and receipts from ore sales were $102,610.

Lands, 164 pertenencias, area 405 acres, in the heart of the Canane Mountains, surrounded by holdings of the Cananea Consolidated. Prope shows rhyolite, quartzite and limestone, carrying at least 4 large ore bodie of very irregular outline, with nearly horizontal dip, main ore body showi a width of 300′, with proven length of 600′, carrying chalcocite and chalcop rite of 3 to 4% average copper tenor. Shipments of May, 1907, averaged 3. copper and 2 oz. silver per ton, with a trace of gold. Development is by th 1,800′ Llave tunnel, developing the main ore body, on ground adjoining th Capote mine of the Greene Cananea, the 1,200′ Eureka tunnel, and a third a lower tunnel, known as the Limestone, and by shafts of 400′, 300′, 300′, 20 100′ and 100′. The mine has about 3 miles of workings, and has been est mated to show 400,000 tons of concentrating ore.

Machinery equipment includes 7 hoists, of 25-h. p. to 150-h. p. each, t air-compressor and power drills.

There are about 25 buildings, including a 20x20′ carpenter shop, 25x3 machine shop, 20x40′ smithy, laboratory, general store and dwellings.

The mine has shipping bins at the mouth of the Llave tunnel, and a sho narrow-gauge railway, connecting with the line of the Cananea Consolidated. Some ore has been shipped to the Douglas smelter, and the property employ circa 75 men, before closing down, March, 1907. While the ore is low in ave age grade, the ore bodies are large, and the management is excellent.

INDIAN CHIEF MINING CO. **BRITISH COLUMBIA.**

Dead. Was succeeded by Spitzee Gold Mines, Ltd. Formerly at Phœnix, Boundary district, B. C.

INDIAN FALLS DEVELOPMENT CO. **CALIFORNIA.**

Office: 1111 C St., Tacoma, Wash. Mine office: Quincy, Plumas Co., Cal. C. A. Darmer, president; J. H. Spencer, vice-president; Horace W. Tyler, secretary; O. B. Roeder, treasurer; preceding officers, Anton Huth, Fred H. Murray and John Arthur, directors; G. H. Goodhue, general manager; Capt. C. Henry Thompson, consulting engineer. Organized May, 1908, under laws of Washington, with capitalization $2,000,000, shares $1 par; issued, $1,600,000.

Lands, 21 claims, area circa 420 acres, also the townsite of Indian Falls, in the Shoefly district, showing talcose schists and slate, with 8 lenticular ore bodies, said to be traceable 12,000', opened by tunnels of 80', 84', 220' and 40', showing chalcopyrite assaying 2% copper, 1.4 oz. silver and $1.10 gold per ton. Has 2 small mine buildings. Company plans development by tunnels, installing a 300-h. p. hydro-electric plant and building a concentrator.

INDIAN GROUP COPPER CO.

Dead. Formerly had an office at 1016-25 Broad St., New York, N. Y.

INDIAN QUEEN CONSOLIDATETD MINING CO. **UTAH.**

Office: Provo, Utah. Mine office: Newhouse, Beaver Co., Wash. Jesse Knight, president; L. N. Morrison, vice-president; R. E. Allen, secretary and treasurer; David Evans, manager; Jas. Quinn, superintendent. Organized 1907, under laws of Utah, with capitalization $150,000. July 1, 1908, had a cash balance of $6,619.95.

Lands, circa 60 claims, principal properties being about 2 miles east of Newhouse, taken over from the Indian Queen and Leland companies. Has a 600' tunnel, planned to be driven circa 2,500', giving a 1,600' back. Has electric power and an air-compressor. Property considered promising and management good.

INDIAN QUEEN MINING CO. **UTAH.**

Dead. Merged, 1907, in Indian Queen Consolidated Mining Co. Formerly at Newhouse, Beaver Co., Utah.

INDIAN SPRINGS COPPER MINING CO. **NEVADA.**

Office: care of T. R. L. Harris, secretary and treasurer, Spokane, Wash. Letter returned unclaimed from former mine office, Goldfield, Esmeralda Co., Nev. E. F. Burns, president; Millard T. Harsten, vice-president; Ross S. Braddock, superintendent. Organized, late 1906, under laws of Washington, with capitalization $1,500,000, shares $1 par. Lands are between Goldfield and Greenwater. Idle and presumably moribund.

INDUSTRIAL COPPER MINING CO. **ARIZONA.**

Dead. Lands were about 2 miles from the Valenzuela mine of the Hub Mining & Investment Co. Formerly at Benson, Cochise Co., Ariz.

INDUSTRIAL MINING CO. **MEXICO.**

Office: Apartado 2, Hermosillo, Sonora, Mex. Letter returned unclaimed from former mine office, Carbó, Ures, Sonora, Mex. W. D. Schellinger, agent. Lands, 20 hectares, known as the Mina Mixto, circa 30 miles west of Carbó.

INDUSTRIAL MINING CO. **MONTANA.**

Office and mine: 114 East Main St., Bozeman, Gallatin Co., Mont. J. W. Wilcox, president; S. J. V. B. Henderson, vice-president, treasurer and general manager; J. M. Morris, secretary. Organized Oct. 2, 1902, under laws of Montana, with capitalization $600,000, shares $100 par. Lands, 12 claims, area 240 acres, well timbered, in an unorganized mining district near Bozeman, showing gneiss, quartzite and shale, said to carry fissure and contact veins, opened by tunnels of 380', 450', 180' and 1,481', showing sulphide ores, reported by company *to average 16 to 40% copper* and 6 oz. silver per ton.

COMPAGNIE d'INGUARÁN. **MEXICO**

Office: 56 Rue de Provence, Paris, France. Mine office: Inguarán, Ari Michoacán, Mex. Ch. Laforgue, general manager; J. L. Philips, superintend ent. Organized Jan. 15, 1898, under laws of France, with capitalizatio 12,000,000 francs, shares 500 francs par. Supposedly is controlled by th French house of Rothschild, and a considerable portion of the company's stock is owned by the Compagnie du Boleo. Property was bought for 1,500,00 pesos, and company is said to have expended about $8,000,000 thereon, whic undoubtedly is an overestimate.

Lands, 185 hectares, also mineral concessions covering 5,000 additiona hectares, in the Tacambara district, lying on the plateau of the volcan Jorullo, circa 1,500′ above the plains. The mountains form a succession o rugged, almost inaccessible peaks, with ore outcrops near their crests, thes of 90′ to 200′ width, having a generally east and west trend. Country rock granite, in several stages of alteration, capped by a silicious limestone 200′ to 300′ thickness. Ore bodies, of immense size, carry almost exclusive copper sulphides, mainly disseminated chalcocite and chalcopyrite, with little bornite, having a granite-porphyry gangue, assays giving 1.5 to 6 copper, 2 to 100 oz. silver and from a trace to 1 oz. gold per ton. As a ru the silver values are considerable, with slight gold values. Proven depth the ore is about 300 meters, at which depth it apparently cuts off. Develo ment is by a 2,500′ tunnel and 2 main shafts, deepest circa 350′, with lev opened at 80′ intervals. Both ore and country rock are exceedingly firm, lit timbering being required. Estimates of size and value of the ore bodies va greatly, but the best authorities estimate an average of circa 3.25% copp with 2,000,000 to 3,000,000 metric tons of ore blocked out. The ore is w adapted to concentration, and apparently could be put about 8 or 10 to into one, before smelting.

Steam and electric power are used, latter secured from a 200-h. p. hydr electric installation at Mata de Plantano, 7 miles from the mine, where the is a stream flowing about 80 litres per second, with an available head of 93 fed by springs that burst forth from the foot of Mt. Jurullo, about 150 year ago, after the last eruption of that volcano.

In 1905 a survey was made for a railway from Patzcuaro, the presen shipping point, to Inguarán, a distance of 32 leagues. A complete survey ha been made, and plans drawn for a railway from the mines to Zihuatenejo south of Acapulco, on the Pacific, the route of the proposed line traversing a rugged country, and requiring several years for construction.

Owing to the fact that this property is controlled by the Rothschilds, and is but rarely visited by mining men, many exaggerated and misleading stories have been printed regarding it. The mine has a large body of low grade ore, but the ore is not equal, in quantity or quality, so that of several other Mexican copper mines. Production, 1904, was only 598,439 lbs. of ore, valued at 21,870 pesos, this doubtless having been shipped for test purposes. Property is idle, and is not likely to become a producer until rail connections are secured, and apparently the company is in no hurry about building a railway, as 10 years have been required to get the property to its present very modest stage of development.

INLAND MINING CO. **MONTANA**

Mine office: Saltese, Missoula Co., Mont. Bonney Swanson, president. Lands, 10 claims, on Dominion Creek, circa 5 miles from Saltese, having tunnels of 100′, 250′ and 550′, upper tunnel showing a 5′ vein carrying ore up to 25% in copper tenor, claimed to average circa 5.5% copper, 11 oz. silver and $6 gold per ton. Property considered promising.

INNAI MINE. **JAPAN.**

Owned by Furukawa Mining Co.

INSIZWA NICKEL & COPPER DEVELOPING CO., LTD. **CAPE COLONY.**

Office: Mount Ayliff, Cape Colony. Mine office: Kokstad, Griqualand East, Cape Colony. Wilfred Vernon Parsons, secretary. Organized circa March, 1908, under laws of Cape Colony, with capitalization £200,000, shares £1 par. Lands are 2 mining areas, formerly held by South Namaqua Syndicate, showing ore disseminated through norite, occasionally occurring as lenticular masses of considerable size in norite, with shale contact. Average assays give 2.05 to 3.37% copper and 3.29 to 4.75% nickel.

INSPIRATION MINING CO. **ARIZONA.**

Office: Kansas City, Mo. Mine office: Globe, Gila Co., Ariz. E. A. Hosier, president; W. A. Neiswanger, vice-president; E. P. Wilder, secretary and treasurer; John D. Coplen, general manager. Has authorized a $200,000 bond issue. Property was under option to General Development Co., but was not sold. Lands, 12 claims, area 240 acres, circa 9 miles west of Globe, near the Live Oak mine. Company also said to have bought, 1906, lands of the Rookwood Copper Co. Mine, having about 1 mile of workings, is opened by the Mercer, Woodson and 2 shorter tunnels. Upper workings show oxidized ores of 4 to 7% copper tenor, succeeded by chalcocite and disseminated chalcopyrite in a ledge of very great width, not all of which is workable, carrying much ore that is below commercial grade at present, though possibly adapted to leaching, and which, in any case, may become valuable in time. Has a 60-ton mill, planned to be doubled in capacity and size to 36x200', terraced in 3 floors. Shipped some ore, 1906. Property considered promising.

INTERCOLONIAL COPPER CO. **NEW BRUNSWICK.**

Office: 702 Banigan Bldg., Providence, R. I. Mine office: Dorchester, Westmoreland Co., N. B. Darius L. Goff, president; T. J. Edwards, secretary. Organized 1899, under laws of Arizona, and capitalization decreased, 1906, to $2,000,000, shares $5 par, in preferred and common shares, latter with restricted voting privileges. Lands, 250 acres freehold and 1,100 acres leasehold from the crown, showing a blanket vein carrying carbonate and sulphide ores, said to give returns of 3 to 4% copper. Has shafts of 40', 75' and 150', also a 1,500' drainage tunnel, with about 8,000' of underground workings.

Works include a 200-ton concentrator, leaching plant and electrolytic refinery, having 2 boilers, 4 engines, crusher, rolls, 15 tubular roasting furnaces, six 300-ton leaching vats and two 50-kw. dynamos. The electrolytic plant has 350 lead cathodes, and 550 lead anodes, 22x33" each, giving a plating surface of 5,000 square feet, for the deposition of electrolytic copper. Plant also includes tanks for precipitation of metal on scrap iron. The reduction plant did not prove satisfactory, machinery going wrong after making about 50 tons blister copper. Idle since 1904 and apparently moribund.

INTERIOR MINING & TRUST CO. **ARIZONA.**

Mine office: Wickenburg, Maricopa Co., Ariz. Frank L. Baldwin, president; D. L. Murray, vice-president; R. W. Baxter, second vice-president; W. J. Casey, manager. Organized December, 1902, under laws of Arizona, with capitalization $3,000,000, shares $1 par. Lands, in the Black Rock district, circa 6 miles northwest of Wickenburg, show ores carrying values mainly in gold. It is said to have a 40-stamp mill. Production, 1907, was 1,616 oz. gold.

INTERMOUNTAIN EXPLORATION CO. **UTAH.**

Office: 26 Mesaba Bldg., Duluth, Minn. Operating office: 208 Atlas Bldg., Salt Lake City, Utah. Mine office: Stockton, Tooele Co., Utah. H. J. Smith, president; Peter Porter, vice-president; Theophilus F. Smith, treasurer; W. H. Brownrigg, secretary; R. D. Raddatz, manager. Organized Sept. 1906, under *laws of Utah, with capitalization* $500,000, in half preferred and

half common shares, of $10 par. Is developing the property of the Dulu
Utah Development Co., at Stockton, and also holds auriferous and argen
erous copper claims in the Silver Rock district of San Bernardino county, C
fornia, and has small holdings of silver claims in Cobalt, Ontario.

INTERMOUNTAIN GOLD & COPPER MINING CO. IDA

Mine office: Pocatello, Bannock Co., Idaho. G. B. Rogers, preside
Frank Ball, treasurer; G. A. Clark, secretary. Lands are the Lost Ho
group, on the Ft. Hall Indian reservation, opened by a 50′ shaft, said to
bottomed in good ore. Idle several years.

INTERMOUNTAIN MINING & INDUSTRIAL ASSOCIATION. UTA

Dead. Lands sold August, 1906. Formerly at Bingham Canyon, Salt La
Co., Utah. Fully described Vol. VI.

SOCIEDAD INTERNACIONAL MINERA i BENEFICIADORA DE HUANTAJAYA. CHIL

Office: Iquique, Chile. Mine office: Huantajaya, Tarapacá, Chile.
ganized June 27, 1900, under laws of Chile, with capitalization 300,000 pe
shares 50 pesos par.

INTERNATIONAL CONSOLIDATED SMELTING & MINING CO. MEXIC

Office: 12 West 38th St., New York, N. Y. Mine office: Guaynopa, Gu
rero, Chihauhua, Mex. Dr. J. M. Bishop, president; Wm. L. Saunders, sec
tary. Organized Jan. 1, 1904, as a merger of Guaynopa Smelting & Reducti
Co. and Mexican Lead Co. The Guaynopa lands, variously reported as 2
hectares and as 133 acres, in Guaynopa Cañon, are claimed to show ores car
ing 5 to 8% copper, with good silver values. Company was promoted
Daugherty & Albers, with the assistance of C. B. James, hence is regarded u
favorably. Idle and moribund.

INTERNATIONAL COPPER CO. ARIZONA

Dead. West Virginia charter forfeited, 1902.

INTERNATIONAL COPPER CO. COLOMBI

Dead. Was a swindle. Formerly at Natagaima, Tolima, Colombia. D
scribed Vol. VI.

INTERNATIONAL COPPER CO. MONTANA

Dead. Was organized June 13, 1906, under laws of Maine, and tit
changed, July 19, 1906, to Montana Consolidated Copper Co. Formerly a
Basin, Jefferson Co., Mont.

INTERNATIONAL COPPER CO. UTAH

Dead. Merged, 1903, in Dirigo-La Sal Gold & Copper Mining Co. Formed
at Castleton, Grand Co., Utah.

INTERNATIONAL COPPER CO., LTD. ARGENTINA

Office: 56 Cannon St., London, E. C., Eng. Capt. W. B. McTaggart
D. L., J. P., chairman; A. Dangerfield, secretary. Organized July 7, 190
under laws of Great Britain, with capitalization £100,000, shares £1 par; issued
£75,000. Was formed to finance the Famatina Development Corporation, Ltd.
having bought £20,000 debentures and £20,000 income bonds of that company
and having agreed to advance £60,000 additional, at 6%, for the erection of
a smelter, if required, securing in return the right to act as exclusive agent
for sale of Famatina company's copper at 2% commission.

INTERNATIONAL COPPER CORPORATION, LTD. NEW CALEDONIA

Dead. Lands sold, 1900, to Caledonian Mining Corporation. Formerly a
Noumea, Diohot, New Caledonia.

INTERNATIONAL COPPER & GOLD CO. COLORADO, MONTANA & MEX

Office: 1122-135 Adams St., Chicago, Ills. A. P. Ballou, secretary-*treasurer;* W. C. Hermbuecher, general manager. Organized 1899, under

ona, with capitalization $3,000,000, shares $1 par. Apparently is a company only, controlling, through stock ownership, the Montana & Gold Mining Co. and the Santa Fé Gold & Copper Mining Co. Sup- controlled by Sonora Central Mines Co. Apparently all properties l company not regarded favorably.

NATIONAL COPPER MINING CO. **ARIZONA.**

ce: P. O. Box 530, Hancock, Mich. Letter returned unclaimed from mine office, Bisbee, Cochise Co., Ariz. Fred. J. Bawden, president; R. Beattie, secretary; Geo. H. Nichols, treasurer; Carl Clausen, general . Organized May 18, 1903, under laws of Arizona, with capitalization 0, shares $10 par. Lands, 14 claims, patented, near Solomon Springs, southeast of Bisbee. Idle since birth and apparently moribund.

NATIONAL COPPER MINING CO. **MEXICO.**

er returned unclaimed from former mine office, Carbó, Ures, Sonora, roperty, in the Carnero Mountains, circa 30 miles west of Carbó, is said 4 veins.

NATIONAL COPPER MINING CO. **UTAH.**

l. Merged, circa 1906, in Boston & Utah Copper Co. Formerly at , Grand Co., Utah.

NATIONAL COPPER MINING CO. OF **MICHIGAN.**
E SUPERIOR.

l. Was wound up, 1901, and lands sold to Wetterhorn Land Co. For- Matchwood, Ontonagon Co., Mich.

NATIONAL COPPER MINING & MILLING CO. **WYOMING.**

e: care of F. M. Dunn, Minneapolis, Minn. Letter returned un- from former mine office, Encampment, Carbon Co., Wyo. Capitaliza- ,000, shares $1 par. Lands, one claim, the Arlington, patented. Has ft. Idle since 1905 and out of cash, with poor prospects.

NATIONAL EXPLORATION & INVESTMENT CO. **ARIZONA.**

l. Succeeded, circa 1902, by Lady Helen Copper Mining Co. Formerly Graham Co., Ariz.

NATIONAL GOLD & COPPER CO., LTD. **ONTARIO.**

e: Mooney-Brisbane Bldg., Buffalo, N. Y. M. M. Wall, president; anley, treasurer; E. F. Goff, secretary; R. E. Erdmann, superintendent. d under laws of Arizona, with capitalization $3,000,000, shares $1 ds, in the Hastings district of Frontenac county, Ontario, have a 100' de and apparently moribund.

NATIONAL GOLD & COPPER MINING CO.

e: 62 Commercial Blk., Salt Lake City, Utah. Somebody gets the at that address. Location of lands, if any, unknown.

NATIONAL GOLD-COPPER MINING CO. **BRITISH COLUMBIA.**

l. Lost lands, circa 1899. Formerly at Rossland, Trail district, B. C.

NATIONAL INDUSTRIAL CO. **ALASKA & WASHINGTON.**

e: Bellingham, Wash. O. B. Brown, president; J. W. Romaine, vice- ; C. T. Canfield, secretary; W. S. Bacon, treasurer. Capitalization 0. Property includes coal mines on Lake Whatcom, near Bellingham, ich coal has been shipped. Has gold claims in the Nome district of nd in Okanogan county, Washington, and copper claims near Valdez, latter apparently idle.

NATIONAL MINE & INVESTMENT CO. **MEXICO.**

e: care of E. F. Fisher, secretary, Douglas, Ariz. Dr. W. E. Lind- dent; J. M. French, treasurer; S. C. Morrison, superintendent. Lands, mencias, adjoining lands of the Santa Rosa Development Co., about outh of Douglas, and 4 miles from the Nacozari railroad, in the Arizpe f Sonora, *Mexico, showing a 2' to 6' quartz* vein carrying oxide and

carbonate ores assaying 3 to 30% copper, and up to 6 oz. silver, wit
of gold, opened by shafts of 20′ to 50′. Also owns sundry mineral la
Mulatos, Sahuaripa, Sonora, Mex. Idle several years.

INTERNATIONAL MINING CO. **AI**

Letter returned unclaimed from former office, Los Angeles, Cal
office: Chloride, Mohave Co., Ariz. John Lopizich, president. I
known as the Elkhart mine, is a silver-lead mine, with strong copper
tions on the 500′ level, at the bottom of the mine, where there is a w
of low-grade silver-lead ore, carrying small copper and gold values. H
50,000 tons of low-grade silver-lead ore on the dump, and has a 100-t
Idle.

INTERNATIONAL MINING CO. **COL**

Dead. Formerly at Black Hawk, Gilpin Co., Colo.

INTERNATIONAL MINING CO., LTD. **ON**

Office: Sault Ste. Marie, Mich. Mine office: Dean Lake, Algon
C. S. Beadle, general manager; V. E. Metzger, secretary and treasurer.
1,400 acres, known as the Brady location, lying in Patton and Thompso
ships, east of the Mississagua river, 5 miles from Dean Lake and circa
east of Sault Ste. Marie, opened by 12 test pits, deepest 24′, showing a
carrying chalcopyrite assaying 5 to 28% copper, with small gold an
values. Idle for several years.

INTERNATIONAL MINING & REFINING CO.

Mine office: Chañaral, Atacama, Chile. Property is an old group o
near Chañaral, also sundry claims in the Huantajaya district of T
Chile. Idle.

INTERNATIONAL SMELTING CO. **M**

Office: 502 Hall Bldg., Kansas City, Mo. Mine office: Suaqui de
Ures, Sonora, Mex. J. V. Hammer, president; H. W. Tracey, secretary
Finley, treasurer. Organized 1905, with capitalization $1,000,000, sh
par. Planned building a smelter, but did not do so. Promised divide
apparently found the hostilities of the Yaqui Indians a convenient pre
failing to carry out its promises. Is regarded with much suspicion.

INTERSTATE EXPLORATION CO. ARIZONA, ILLINOIS & WISC

Office: Endicott Bldg., St. Paul, Minn. Maj. E. L. DeLestry,
manager. Claims to have copper claims at Globe, Gila Co., Ariz., a
and lead claims at Benton and Platteville, Wis., and at Galena, Ills.

INTER STATE MINING CO. **MON**

Office and mine: Helena, Lewis & Clark Co., Mont. Organize
Lands, 19 claims, in the Amazon district, circa 30 miles from Helena,
a 4′ vein, and silver, lead and argentiferous copper ore, in a vein of 4
width, traceable nearly one mile. Company formerly operated near
ville, Montana, but abandoned the original properties and secured, 19
Amazon group, from A. L. Palmer.

INTERSTATE MINING & MILLING CO. **I**

Mine office: Mullan, Shoshone Co., Idaho. M. J. Rodermill, pre
C. M. Crago, vice-president; R. M. Fox, secretary; O. D. Wallace, m
preceding officers, C. L. Stacy, W. P. Russell and M. H. McCall, di
Lands, 24 claims, well timbered, adjoining the Hercules mine on th
and the Callahan on the east, said to show an 18″ vein of massive or
aging 10% copper and 20% lead, with good silver values. Development
a tunnel, planned to be driven 2,800′, cutting 3 veins to give backs o
800′ and 1,000′.

INVESTORS MINING & PROSPECTING CO. **WYO**

Office: P. O. Box 132, Encampment, Wyo. Mine office: Rambler, 4
Co., Wyo. Aaron Slothower, president and general manager; C. E. W

ent; C. B. Bergquist, secretary and treasurer. Organized July 19, r laws of Wyoming, with capitalization $1,000,000. Lands, 8 claims, nted, area 84 acres, in the Battle Lake district, showing a contact en schist and quartzite, up to 22′ in width, with a gossan showing zed ores, changing to chalcopyrite at slight depth. Has a 110′ shaft. l years.

PPER CO. **CALIFORNIA.**

office: Darwin, Inyo Co., Cal. Chas. Wing, manager. Presumably idle.

PPER MINES & SMELTERS CO. **CALIFORNIA.**

: 353 Kearny St., San Francisco, Cal. Mine office: Keeler, Inyo Co., loys 10 men. R. G. Paddock, president and general manager. T. J. ns, vice-president; Philip S. Montague, secretary; H. L. Wrinkle, Organized July 3, 1905, under laws of Arizona, with capitalization , shares $1 par.

, 21 claims, area 415 acres, showing limestone, granite and grano- untry rocks, with porphyrytic intrusions, carrying 8 contact veins, imestone and porphyry or grano-diorite, showing a little native cop- chite, azurite, chalcopyrite and chrysocolla, in veins of 2′ to 40′ id to give average assays of 12% copper, 6 oz. silver and $7.50 gold Development is by several shallow shafts, one planned to be sunk to by several tunnels.

)UNTY CONSOLIDATED COPPER CO. **CALIFORNIA.**

· 254 Wilcox Bldg., Los Angeles, Cal. Mine office: Citrus, Inyo Formerly held 5 gold claims and 12 copper claims; sold 5 copper New York & Inyo Copper Co. Idle and apparently moribund.

NEW MEXICO MINING CO. **NEW MEXICO.**

. Formerly at Carrizozo, Lincoln Co., N. M.

:N HERMANOS y CA. **MEXICO.**

office: Huetamo, Michoacán, Mex. Production, 1902, was 107,804 copper. Presumably idle.

OPPER MINES, LTD. **IRELAND.**

e: Great Winchester St., London, E. C., Eng. Lt.-Col. E. B. Burnaby, ; R. L. Spicer, secretary. Organized July 10, 1906, under laws of itain, with capitalization £60,000, in 50,000 ordinary shares, par £1, 00 deferred shares, par 2s.; issued, £10,512. Was organized to acquire k copper mines near Waterford, Ireland. Cannot be learned that has been secured.

IAG MINE. **ARIZONA.**

ed by Calumet & Arizona Mining Co.

IINES. **ARIZONA.**

e office: Clifton, Graham Co., Ariz. B. A. Boyles, president; N. L. ice-president; Otto Rosenthal, secretary; C. P. Dunn, treasurer. Lands, , said to show a vein of 10′ to 15′ width, carrying oxides and altered ores, with values up to 15% copper, opened by a 100′ tunnel. Idle ars.

MINES PROPRIETARY CO., LTD. **IRELAND.**

ce: 4 Dawson St., Dublin, Ire. Mine office: Bonmahon, Co. Water- e. Organized Aug. 2, 1906, under laws of Ireland, with capitali- 20,000, in 10,000 ordinary shares, £1 par, and 100,000 deferred shares, Idle.

)AP MINE. **ARIZONA.**

ned by National Mining Exploration Co.

)AP MINING CO. **ARIZONA.**

ce: Globe, Ariz. Mine office: Florence, Pinal Co., Ariz. Original near Globe, *were sold to National Mining* Exploration Co. Present

property, 5 claims, held under bond and lease, is in the Picacho d miles south of Florence. Presumably idle.

IRONCLAD COPPER MINING CO. WASH

Office: Portland, Ore. Mine office: Spirit Lake, Skamania Dr. P. L. McKenzie, manager; W. H. Warren, secretary. Lands, 10 the St. Helens district, show 2 veins, slightly developed, giving ave values of about $25 per ton, in copper, silver and gold. Idle several

IRON CROWN MINING & MILLING CO.

Dead. Succeeded Jan. 6, 1908, by Copper Crown Mining Co. P Mullan, Shoshone Co., Idaho.

IRON DYKE COPPER CO.

Office: care of Erie Trust Co., Erie, Pa. Mine office: Homest Co., Ore. C. N. Conrad, president; H. G. Fink, vice-president; A. secretary; F. F. Curtze, treasurer; preceding officers, Geo. R. M Davenport Galbraith, directors. Frank E. Pearce, superintendent. under laws of Pennsylvania, with capitalization $500,000, shares Property shows considerable ore, on the dumps and blocked out f having several thousand feet of workings. Erie Trust Co. holds tit deed and bond. Presumably idle.

IRON FALLS GOLD & COPPER MINING CO. WASH

Dead. Formerly had an office at 713 New York Blk., Seattle, W

IRON HAT COPPER-GOLD MINING CO. CO

Dead. Formerly at Silverton, San Juan Co., Colo.

IRON HAT MINING CO.

Mine office: Eureka, Juab Co., Utah. Wm. Hoffman, supe Lands are in the East Tintic district. Presumably idle.

IRON HORSE MINING & MILLING CO.

Mine office: Globe, Gila Co., Ariz. Organized 1904, with ca $500,000. Idle.

IRON KING EXTENSION MINING CO.

Dead. Was a Douglas, Lacey & Co. swindle. Formerly at Yavapai Co., Ariz.

IRON KING MINE.

The Iron King mine at Humboldt, Yavapai county, Arizona, is the American Gold & Copper Consolidated Mining Co.

IRON KING MINE.

The Iron King mine at Jerome, Yavapai county, Arizona, is ow Equator Mining & Smelting Co.

IRON MASK GOLD MINING CO. BRITISH CO

Dead. Formerly owned the Iron Mask mine, which was sold closure, circa 1901, to B. C. Corbin, who sold to the Consolidated Smelting Co. of Canada, Ltd. Office of company was at Spokane, W merly at Rossland, Trail district, B. C.

IRON MASK MINE. BRITISH CO

Owned by Kamloops Mines, Ltd.

IRON MOUNTAIN COPPER CO.

Mine office: Lund, Iron Co., Utah. Has argentiferous lead ore ferous copper ore. Idle since circa 1903.

IRON MOUNTAIN MINE. CAL

Owned by Mountain Copper Co., Ltd.

IRON SILVER MINING CO. CO

Offices: 1408-27 William St., New York, N. Y., and 615 Stevens troit, Mich. Mine office: Leadville, Lake Co., Colo. DeForest Pa *dent; W. R.* Cobb, vice-president; Homer A. Hoit, secretary; Frémont *treasurer;* preceding officers, Hon. Thos. W. Palmer, Gen. Anson G

John Greenough, Winfield Scott, Henry G. Stevens and Samuel R. Reinhardt, directors; Waldemar Arens, general manager; Wm. Carson, superintendent; Geo. O. Argall, engineer. Organized March, 1880, under laws of New York, with capitalization $10,000,000, shares $20 par. Dividends, 1906, were $400,000, and 1907 were $300,000, with total dividends, to end of 1907, of $4,100,000. Net earnings have been as follows: $267,035.64 in 1904; $515,127 in 1906; $65,366.14 in 1907. Company begun 1908 with a surplus of $189,259.60. Farmers Loan & Trust Co., New York, registrar. Annual meeting, second Wednesday in March.

In addition to other properties, company controls, through stock ownership, the Nisi Prius Consolidated Mining Co., mine being leased to 3 different parties. Operating mines of the Iron Silver are the Moyer, Tucson and Dome, the Moyer being much the most important, having circa 2 miles of workings. The Tucson shaft is 925′ deep. Ores are mainly sulphide, the Dome mine furnishing zinc and lead carbonates, the Tucson mine supplying argentiferous zinc and lead ores, and the Moyer mine yielding argentiferous and auriferous zinc, lead and copper ores, and iron ore. Production has been as follows: 47,865,699 lbs. zinc, 3,608,351 lbs. lead, 948,902 lbs. copper, 950,067 oz. silver and 3,049 oz. gold in 1904; 61,738,134 lbs. zinc, 4,542,938 lbs. lead, 69,477 lbs. copper, 425,050 oz. silver and 2,043 oz. gold in 1906; 34,239,954 lbs. zinc, 489,047 lbs. lead, 21,321 lbs. copper, 298,598 oz. silver and 1,360 oz. gold in 1907. Property is well equipped and well managed, but inclined to show decreased production.

IRON SPAR COPPER MINING CO. **MONTANA.**

Letter returned unclaimed from former mine office, Mullan, Shoshone Co., Idaho. John J. Curran, manager. Lands, on the Montana side of the divide, in Leslie Gulch, are opened by a 375′ tunnel, showing chalcopyrite and galena assaying up to 22.5% copper, 52% lead, 8 oz. silver and $2.80 gold per ton.

IRONWOOD & ARIZONA DEVELOPMENT CO. **ARIZONA.**

Office: Ironwood, Mich. Letter returned unclaimed from former mine office, Salome, Yuma Co., Ariz. Lands, 28 claims, in the Harcúvar Mountains, 7 miles northwest of Salome, opened by a shaft of circa 150′, said to show high grade sulphide ore. Idle and likely to be liquidated.

IROQUOIS COPPER CO. **MICHIGAN.**

Dead. Was liquidated, circa 1899, and lands sold to Osceola Consolidated Mining Co. Formerly at Kearsarge, Houghton Co., Mich.

IRVINEBANK MINING CO. **QUEENSLAND.**

Office: Irvinebank, Queensland, Australia. Mine office: Klondyke, via Mungana, Queensland, Australia. Geo. C. Young, secretary; Dan Mackey, mine manager. Company employs circa 700 men, and incidentally is engaged in copper mining, on a small scale. Property includes the Linedale West Chillagoe and the Lamington mines, latter having a 160′ shaft showing a 12″ vein averaging circa 20% copper and 5 to 6 dwts. gold per long ton.

Smelter has a water-jacket blast-furnace, planned for treatment of both copper and silver-lead ores, and also for the accumulation of tin slag, which seems a rather ambitious program for one small furnace. Produced, 1906, from the Lamington mine, circa 400 tons of 17% ore, carrying circa 150,000 lbs. fine copper, which was sold to the Chillagoe.

IRVINGTON SMELTING & REFINING CO. **NEW JERSEY.**

Works office: Irvington, Essex Co., N. J. Property is a small electrolytic refinery.

ISABEL COPPER MINING CO. **WYOMING.**

Dead. Lands sold, October, 1902, to Rambler Mining & Smelting Co. formerly at *Riverside, Carbon Co., Wyo.*

ISABELLA MINING CO. NEW MEXIC

Mine office: Tres Piedras, Taos Co., N. M. Property is the Whale min said to show ore of good copper tenor.

ISLAND CITY COPPER MINING CO. WYOMIN

Office: Eaton Rapids, Mich. Letter returned unclaimed from form mine office, Saratoga, Carbon Co., Wyo. Has a copper ore body occurring a contact between a norite dike and schist. Idle since circa 1904.

ISLAND MINING CO. MICHIGAN

Office: 1000-32 Broadway, New York, N. Y. W. R. Todd, president; W A. O. Paul, secretary and treasurer. Organized under laws of Michigan, wit capitalization $1,000,000, shares $25 par; $13.75 paid in. Michigan charte expired 1904, but company has been unable to secure sufficient representation of stock to obtain an extension of its corporate existence. Last meeting of stockholders, held June 5, 1900, authorized a dividend of 80 cents per share Property is circa 4,000 acres of mineral land on Isle Royale, Michigan.

ISLAND MOUNTAIN CONSOLIDATED COPPER CO. CALIFORNIA.

Dead. Formerly in Trinity county, California.

ISLANDS COPPER CO. BRITISH COLUMBIA.

Office: 234 Eppler Blk., Seattle, Wash. Lands include the True Blue group, on Valdez and Gowlland Islands, in the Nanaimo district of British Columbia, having a 50′ shaft on a vein in diorite. Trial shipment, 22 tons, to the Tyee smelter, assayed 2.84% on low grade ore and 6.2% on high grade ore, with small gold and silver contents.

ISLE ROYALE CONSOLIDATED MINING CO. MICHIGAN.

Dead. Succeeded, March, 1899, by Isle Royale Copper Co. Formerly at Houghton, Houghton Co., Mich.

ISLE ROYALE COPPER CO. MICHIGAN.

Office: 303-199 Washington St., Boston, Mass. Mine office: Houghton, Houghton Co., Mich. Employs circa 400 men. Albert S. Bigelow, president; Hon. Norman W. Haire, vice-president and general manager; Wm. J. Ladd, secretary and treasurer: preceding officers, Clarence H. Bissell and Chas. N. King, directors; Wm. J. Uren, general superintendent; James E. Richards, mine superintendent; James G. Glanville, mill superintendent; Chas. D. Hohl, chief engineer; John T. Reeder, chief clerk and purchasing agent; Harry E. Lukey, clerk; Edward Colenso, chief mining captain.

Organized March, 1899, under laws of New Jersey, with capitalization $3,750,000, shares $25 par, as a merger of the Isle Royale Consolidated Mining Co. and Miners' Copper Co. Owns $50,000 stock in the Lake Superior Smelting Co. Annual meeting, first Wednesday in April, at Jersey City.

Lands, 3,520 acres and an 80-acre millsite. Mining lands include the old Isle Royale, Grand Portage and Huron mines, the Dodge and Frue prospects and sundry undeveloped lands. The Hussey-Howe tract of 280 acres, lying northeast of the Superior and carrying the extension of the Baltic bed, was bought, 1907, for $220,000. An option on the mineral rights of the Montezuma tract, of circa 240 acres, lying next west, has expired. Lands include all of Sections 1, 2 and 11, and parts of Sections 3, 9, 10 and 15, T. 54 N., R. 34 W., also 160 acres in Section 6, T. 54 N., R. 33 W., 40 acres in Section 31, T. 55 N., R. 33 W., and 160 acres in Section 36, T. 55 N., R. 34 W., giving a compact tract carrying about 2½ miles of the strike of the system of copper-bearing beds.

The three old mines included in the present Isle Royale tract, made 48,452,590 lbs. fine copper, of which the Huron furnished 35,766,225 lbs., the Isle Royale 9,204,071 lbs., and the Grand Portage 3,482,294 lbs. These products were secured under primitive conditions, at a net aggregate loss of above *$2,500,000.* The old Isle Royale and Grand Portage mines were opened

d the Huron in 1855. The history of all three is given in detail in

Isle Royale has 3 parallel amygdaloidal beds, with strike of N. 32° E. rage dip of 56°, of which two have been extensively opened, these be- Isle Royale and Portage, the latter lying approximately 200′ west of mer. The shafts are on the Isle Royale lode, but the Portage bed is on many levels by crosscuts. East of the amygdaloids is the "Mabbs lying near the Eastern Sandstone, 4′ to 7′ wide and rich in mass and opper, but deficient in stamp rock. It was opened to a depth of about John and Austin Mabbs, circa 1875, and has been tested, to some by the present owner. There also are unidentified and unexplored cop- ring amygdaloids, lying west of the Portage bed, and occasional narrow veins, carrying arsenical copper ores. Considerable diamond drilling n done, and new openings were 8,251′ in 1906 and 8,728′ in 1907. The orks 27 power drills, which number is to be considerably increased.
addition to the new shafts, there are 28 old shafts in the three old and masonry dams have been built underground, at various points, to ck the water in the old openings. There are about 5 miles of old s in the Huron, and 3 miles in the old Isle Royale and Grand Portage

1 shaft, near the northern boundary, was completely gutted by fire, er, 1903. This shaft had 3 compartments, and was 1,335′ deep, opened sle Royale bed, with crosscuts driven on the eleventh to fifteenth levels, e, to the Portage bed, lying 150′ to 220′ westward, with about 2 miles s opened thereon, stoping having been about equally divided between beds, which were found markedly similar in characteristics and copper The surface plant at No. 1 was dismantled, 1908, machinery being ainly to No. 4 shaft. Concrete dams have been built across the south f No. 1 at the thirteenth and fourteenth levels, holding back the mine Surface water is collected on the eighth level, and sent to No. 2 shaft ing out.
2 shaft, with 3 compartments, 2,400′ deep, is located 2,280′ southwest 1, and in 1908 supplied two-thirds of the rock tonnage of the mine, its ion running about 13 lbs. fine copper only, as against circa 17 lbs. fine per ton from the rock of the 3 new shafts. Stoping is in progress e thirteenth to the twenty-second levels, inclusive. Less mass copper g produced than formerly, and the north drifts are not looking espe- ell.
3 is merely a site for a shaft, to reopen the old Huron mine, which rkings nearly 1,900′ in depth. In 1908 the nineteenth level south drift 2 was sent under the old Huron workings, which remain filled with

e new shafts, Nos. 4, 5 and 6, all on the Isle Royale bed, at the southern the property, have about 2 miles of workings. These shafts show con- le heavy copper, the amount of mass copper raised May, 1908, having early 50 tons. The new shafts have been connected with the railroad d given permanent equipments.
4 shaft, circa 3,100′ south of No. 2, was 425′ deep October, 1908, de- g good stamp-rock. Equipment includes a 32x72″ Nordberg duplex- hoist, good for one mile depth, and a 35-drill air-compressor, both from No. 1 shaft. There is a cylindrical steel shaft-rockhouse, built by isconsin Bridge & Iron Co., having cylindrical rock-bins 42′ in diameter 2′ high. The power plant has a 140′ steel brick-lined self-supporting

5 shaft, *circa 5,100′ south of No. 2, on Section* 2, was begun October,

1906, and was circa 425′ deep October, 1908. The shaft is sunk in the wall, and will be given a new shaft-rockhouse similar to that at No. 4, in

No. 6 shaft, formerly known as the Section 11 exploratory shaft, is 7,300′ southwest of No. 2, near the centre of Section 11, and was cut d 1908, to 3-compartment size. The shaft was 550′ deep October, 1908, dev ing very good average ground, the bed showing much epidote. Levels opened at 120′ intervals. The permanent equipment, added 1908, includ brick engine-house, steel boiler-house with a 140′ brick-lined self-suppo steel stack, and a circular steel shaft-rockhouse, similar to that at No. 4.

A shaft was started, 1904, on Section 10, but was discontinued becau the heavy overburden, and a diamond drill substituted, the drill cores sho an amygdaloidal bed, of which about 5′ in width carried stamp-coppe fine grains.

The Section 12 shaft was begun October, 1905, and was discontin January, 1908, at depth of 812′, after drifts and crosscuts had been d four ways to locate the Baltic bed. The shaft was sunk in a badly distu bed, practically barren of copper, and was abandoned because later dev ments showed the Baltic bed to be located elsewhere on Isle Royale lands.

The new Baltic shaft, on the Hussey-Howe tract, was circa 35′ deep ber, 1908, with temporary equipment, and a promising showing of copper found therein, on the Baltic bed, Nov. 1, 1908.

Shafts Nos. 1 and 2 formerly had duplicate equipments. No. 2 has a combination shaft-rockhouse, 44x60′ in size and 90′ high, with 18 and 13x20″ Portage Lake crushers. The engine-house is 50x90′, of ste stone foundations, with a hoist having 18′ 6″ drums with lathe-turned gr for 6,000′ of 1½″ cable, capable of raising 6-ton skips from a depth of 6 The compressor-house has a 35-drill Nordberg 2-stage air-compressor. boiler-house is 44x72′, with a 16x72′ coal-storage addition, and a 3,00 coal trestle, with three 150-h. p. 84″ Burt Horizontal boilers, taking from a dam 300x500x6′. The machine shop is 40x60′, of steel, on stone fou tions. There are about 100 dwellings on the company's lands.

The Isle Royale railroad, owned by the company, connects the mine mill with about 5 miles of main line, having easy grades, and was reball and bridges and trestles strengthened, 1908, for heavier rolling stock. E ment includes 35-ton, 55-ton and 60-ton locomotives, and 40 forty-ton steel cars equipped with air-brakes.

The millsite, at the mouth of Pilgrim River, has nearly one mile of fron on Portage Lake. The mill, 134x210′, of steel frame, on stone foundations three 2,000-ton rock-bins and 3 Nordberg stamps having circular mortars ⅜″ screen openings. As built, each stamp had 32-ton mortars, restin anvil-blocks bedded on 20x20′ platform 3′ thick, of 14x24″x20′ oak tim Underneath each platform is a caisson, reaching to bedrock, made of boiler steel, 74′ long and 12′ in diameter, until near the top, where the a bell-shaped flare, 20′ in diameter, to support the oak platforms under the anvil-blocks. The caisson and spaces between are filled with con The first head was rebuilt, 1908, and given solid concrete foundations to rock. The first head was changed over, March, 1905, to the steeple-comp system, and a second was altered similarly, during the latter half of 190 third remaining a simple head, of circa 500 tons daily capacity, whil compound heads are of about 750 tons daily capacity each. The dre floor has 72 rough jigs and 30 finishing jigs, of the Parnall-Krause type, lar slime tables, and Bartlett and Wilfley tables to treat slimes from the tables. There are rolls with fixed bearings to regrind coarse gravel fro mortars.

The mill has a complete machine-shop, on the second floor, and pow

furnished by a 750-h. p. engine, taking steam from four 250-h. p. boilers in a 46x72' boiler-house at the rear of the mill.

There is a 32x600' wharf, with deep water alongside, at the millsite, with appliances for unloading coal and general freight, and for the dispatch of mineral, in scows, to the smelter at Dollay Bay, 2 miles across Portage Lake.

Water is furnished the mill by a 16,000,000-gallon Nordberg Corliss pump, especially designed to handle muddy water, having a triple discharge into a 30" riveted steel water-main running 2,200' from pump-house to mill, the pump being located some distance from the mill to obviate stamp-sand clogging the intake. Three 100-h. p. boilers furnish power for the pumps, fuel being taken from a large coal-trestle at the rear of the pump-house boiler-rooms. A dam near the mill furnishes feed-water for boilers.

Production of fine copper has been as follows: 3,569,748 lbs. in 1902; 3,134,601 lbs. in 1903; 2,442,905 lbs. in 1904; 2,973,761 lbs. in 1905; 2,937,098 lbs. in 1906; 2,354,198 lbs. in 1907. Yield of fine copper, per ton of rock stamped, has been remarkably uniform, showing less variation than almost any other mine in the Lake Superior district, returns for 5 years, 1903 to 1907, inclusive, ranging from a minimum of 15.2 lbs. per ton in 1905 and 1907 to a maximum of 15.8 lbs. in 1904. Production, September, 1908, was about 18,000 tons of rock stamped, yielding circa 175 tons of mineral, or about 265,000 lbs. fine copper. The new shafts should be capable of more than doubling the former production, and 1909 should show a considerable increase in output.

Costs per ton of rock stamped have been as follows: $1.86 in 1903; $1.86 in 1904; $1.71 in 1905; $2.25 in 1906; $2.92 in 1907. Costs per pound of fine copper have been as follows: 11.83 cents in 1903; 13.3 cents in 1904; 12.76 cents in 1905; 12.22 cents in 1906; 17.09 cents in 1907. In addition to the preceding figures, costs per pound, for exploration, railway extensions, etc., brought the total cost of copper, in 1906, to 14.69 cents per pound, and in 1907 to 20.26 cents per pound.

The company began 1907 with a balance of assets of $772,592.99, and ended with a balance of $501,157.64. Based on figures of shrinkage of assets alone, 1907 was the worst year that the company has experienced, but, taking into consideration the progress made in opening three new shafts on the Isle Royale bed, the year was one of the most satisfactory in the company's history, but an even better mining showing was made in 1908, with continued developments of a satisfactory nature in the new Isle Royale shafts, and the location of the northern extension of the Baltic bed, on the Hussey-Howe tract. The company has ample resources, including a very large cash surplus and magnificent equipment, and has a courageous management, which is entitled to great credit for its persistent search for mineral values, and the prospects of the company seem brighter than at any time in the past.

ISLE ROYALE LAND CORPORATION, LTD. **MICHIGAN.**

Office: 24 North John St., Liverpool, Eng. Local office: care of Fred W. Nichols, agent, Houghton, Houghton Co., Mich. W. J. Thompson, J. P., chairman; John Tibbs, secretary. Organized June 21, 1890, as Wendigo Copper Co., Ltd., and name changed to present title July, 1901. Capitalization £25,000, shares £5 par, in 2,000 first preference, 1,089 second preference and 1,911 ordinary shares. Preference shares, all issued and fully paid; 34,504 ordinary shares issued, £4 paid in. Last published accounts, of date Dec. 31, 1905, showed a debit balance of £7,348. Lands, 83,720 acres, mainly copper-bearing, upon the northern fold of the Keweenawan syncline, on Isle Royale, Lake Superior, Michigan, comprising the major portion of the area of this, the largest fresh-water island of the globe. Considerable mining, of a rather prospectory nature, has been done upon these lands, at various periods in the past, and some *copper secured. Idle since 1892.*

SOCIETÀ METALLURGICA ITALIANA. ITAL

Works office: Leghorn, Tuscany, Italy. Organized 1887, and capitaliz tion since increased to 10,000,000 lire. Net profits, 1904, were 641,067 lire, an a dividend of 7.5% was paid for that year. Property includes 3 plants, t largest, at Leghorn, occupying about 25 acres, with a smaller plant at Limes

Smelter, in connection with the works, has 4 blast-furnaces, of about tons aggregate daily capacity, and 4 reverberatory furnaces casting refin copper as anodes, plates, ingots, etc. The smelter treats about 20,000 tons ore yearly, partly native but largely imported from Spain, America and el where. In connection with the smelter there is an electrolytic refinery, bu 1900, which turns out copper of very great purity.

The power plant of the works has 16 engines, with about 1,800 aggrega h. p., and a very complete electric plant, furnishing power, light and ener for the electrolytic refinery. The shops are extensive, including rolling mil tube mills, wire-drawing shops, wire-rope shops and miscellaneous shops f the manufacture of copper into a great variety of forms. There is a spec alloy foundry having 28 crucible furnaces, for fusion of the principal copp alloys, the products of these works enjoying an excellent reputation. The also is an extensive acid plant for the manufacture of sulphuric acid. T company turns out nearly 10,000 metric tons of manufactured copper yearl in almost an infinite variety of forms, and employs about 1,300 men.

ITMAY MINE. WYOMIN

Office: care of I. C. Miller, Rawlins, Wyo. Mine office: Rambler, Carbo Co., Wyo. Albert Bryle, superintendent. Is not an incorporated company Lands, circa 4 miles south of Rambler, have a drainage tunnel and a 35 shaft, showing a vein up to 8′ in width, carrying occasional native copper an sulphide ore, formerly claimed to average 30% copper and 4 to 5% lead, bu actually averaging about 8% copper only. Lands are said also to have a 2 vein carrying a 3′ paystreak of high grade ore. It was claimed, June, 1906, that a 200-ton reduction plant had been bought, and was to be installed, bu this apparently was a pipe-dream.

IT MINING CO. ALASKA

Mine office: Ketchikan, Alaska. Lands, on Kasaan Bay, showing auriferou copper ore, are opened by a crosscut tunnel. Plans a one-mile tram, with a 1,200′ gravity section leading to a 1,200′ wharf, on tidewater.

ITSUKI MINE. JAPAN

Mine office: Itsuki-mura, Kuma-gori, Higo, Japan. Ore is chalcopyrite, associated with iron pyrites, averaging 5 to 6% copper, in veins interbedde in clay-slates. Production, 1900, was 1,080,163 lbs., falling to 441,407 lbs. i 1906 and to 330,262 lbs. in 1907.

IVANHOE MINING CO. ARIZONA

Mine office: Patagonia, Santa Cruz Co., Ariz. A. P. Abell, president Jas. Johnson, vice-president and general manager. Capitalization $750,00 shares $50 par. Lands, 12 claims, 4 miles southwest of Patagonia, opened b tunnel, with about 500′ of workings, showing highly argentiferous lead an copper ores. Presumably idle.

IVANHOE MINING CO. UTAH

Letter returned unclaimed from former mine office, Bingham Canyon, Sal Lake Co., Utah. Is in litigation with the United States Smelting & Refinin Co., but otherwise idle.

IVANPAH CONSOLIDATED SMELTING CO. CALIFORNI

Dead. Property passed to Cocopah Copper Co. Formerly at Manvel, Sa Bernardino Co., Cal.

IVANPAH MAMMOTH GOLD & COPPER MINING CO. CALIFORNI

Office: San Diego, Cal. Letter returned unclaimed from former mi

office, Ivanpah, San Bernardino Co., Cal. Capitalization $2,000,000, shares $1 par. Lands, 22 claims, 11 freehold and 10 held under option, area 435 acres, 12 miles west of Ivanpah, formerly claimed to show a ledge 300′ wide and 6,000′ long, which, at last accounts, had shrunk, most unaccountably, to 8′ width, of which 6′ is said to carry argentiferous and auriferous copper and lead sulphides, formerly claimed to give surface assays of $9 to $105 per ton. Idle and apparently moribund.

JACK POT MINING & MILLING CO. **WYOMING.**

Office: 365 Tenth St., Oshkosh, Wis. Mine office: Coppertown, Carbon Co., Wyo. Employs 4 men. Ole Granberg, president and general manager; H. Thorsgaard, vice-president; H. O. Granberg, secretary and treasurer; J. M. Riggs, superintendent. Organized Dec. 23, 1903, under laws of Wyoming, with capitalization $1,000,000, shares $1 par. Lands, 9 patented claims, area 180 acres, in the Battle Lake district, showing fissure veins in diorite and chloritic schist, and 2 contact veins, between diorite and porphyry, carrying carbonate and sulphide ores. Two veins under development are said to average 14′ and 40′ width. The smaller vein has given average assays of 8% copper and $3 to $12 gold per ton, the larger vein showing very low grade copper ore, apparently not of commercial tenor. Development is by a 75′ tunnel, 100′ shaft and 8 pits of 20′ to 36′ depth, with 411′ of workings. Idle.

JACK TAR COPPER CO. **ARIZONA.**

Dead. Was a swindle, perpetrated by the Wm. F. Wernse gang, of St. Louis. Formerly at Pima, Graham Co., Ariz.

JACQUA COPPER MINING CO., N. L. **AUSTRALIA.**

Office: 113 Pitt St., Sidney, N. S. W., Australia. Mine office: Jacqua Creek, Argyle Co., N. S. W., Australia. Organized, early 1907, under laws of New South Wales, with capitalization £2,000, shares £1 par. Presumably idle.

JALISCO COPPER MINING CO. **ARIZONA.**

Dead. Was a stock-jobbing enterprise. Formerly at Oro Blanco, Pima Co., Ariz. Described Vol. III.

JALISCO COPPER MINING & SMELTING CO. **MEXICO.**

Dead. Delaware charter repealed, 1903. Formerly in state of Jalisco, Mexico.

JALISCO MINING & DEVELOPMENT CO. **MEXICO.**

Office: care of Dennis Ryan, St. Paul, Minn. Mine office: Ahualulco, Jalisco, Mex. Organized, circa 1906, to take over property of Altamira Mining Co. Idle.

JALISCO (MEXICAN) MINING SYNDICATE, LTD. **MEXICO.**

Office: 54 New Broad St., London, E. C., Eng. A. Firth, Chairman; M. P. Gosset, agent in Mexico; G. V. Mitchell, mine superintendent; Alfred Hays, secretary. Organized Jan. 18, 1906, under laws of Great Britain, with capitalization £25,000, shares £1 par; issued, £16,000. Company claims to possess 80 denencias, area 198 acres, carrying ores of gold, silver and copper, at Malpillas, Jalisco, Mexico, but there is no postoffice by the name of Malpillas, Malpillas or Milpillas in Jalisco, or elsewhere in Mexico. Regarded with suspicion.

JAMAICA CONSOLIDATED COPPER CO. **JAMAICA.**

Office: 262 Washington St., Boston, Mass. Mine office: May Pen, Clarendon, Jamaica. T. I. Hogan, president; E. F. Gowell, Clerk; R. W. Goss, treasurer; W. S. Baker, general manager; Cyril Abraham, superintendent. Organized circa September, 1907, under laws of Maine, with capitalization $6,000,000, shares $1 par.

Lands, 2,276 acres, held on 99-year lease, 15 miles from the coast, in the Clarendon Hills. Property includes the Congo Hill mine, having a 455′ tunnel showing a small vein *carrying chalcopyrite and* bornite; the Copper Wood

mine, having a 270' tunnel, showing a small stringer of bornite; mine, having a 75' tunnel showing bornite and chalcocite, said to copper; the Elma mine, having a 240' tunnel, and the Iva mine, ha tunnel. Wages for labor are 18d. per day.

Small shipments of ore were made from this property, 1854-1857, pany estimates that it can place copper in New York for 6.5 cents and that it will be mining 200 tons of ore daily by middle of 19 of which estimates seem warranted. Is regarded with suspicion.

JAMAICA COPPER CO. J

Dead. A stock-jobbing enterprise. Formerly in Jamaica. Describ

JANIE MINING CO.

Dead. Lands sold, 1907, to Mexican Mines Corporation. Fo Baca, Hidalgo, Chihuahua, Mex.

JANOS MINING CO.

Dead. A swindle. Formerly at Casas Grandes, Galeana, Chihua Described Vol. VI.

JAPAN-FLORA MINES & TUNNEL CO. CO

Office: 310 Colorado Bldg., Denver, Colo. Mine office: Tell Miguel Co., Colo. J. J. Fisher, president; Col. A. G. Brownlee, vic and general manager; J. H. Cunningham, treasurer; Wm. E. Humph tary. Organized Aug. 22, 1903, under laws of Colorado, with cap $2,000,000, shares $1 par.

Lands, 35 patented claims, area 317 acres, in the upper San M trict, showing 8 fissure veins, in brecciated andesite, carrying auri argentiferous galena and iron pyrites, with quartz gangue, averag 0.5% copper, 10% lead, 8% zinc, 23.5 oz. silver and $10 gold per t by a 685' shaft and 8 crosscut tunnels, two longest 1,600' and and 2 19,665' of underground openings, estimated to give 150,000 tons of o out for stoping. Has steam and electric power, with a 45-h. p. hoist air-compressors, power drills and shops. Property has produced co ore. Closed down, October, 1905, but shipped a little ore, 1907. P idle.

JARILLA COPPER CO. NEW

Dead. Reorganized, 1903, as Three Bears Copper Co. Formerly Otero Co., N. M.

JARILLA MINING & SMELTING CO. NEW

Mine office: Jarilla, Otero Co., N. M. Lands, 20 claims, held un bond and lease, expiring 1909. Idle and apparently moribund.

JASPER COPPER CO. (

Office: 716 Torrey Bldg., Duluth, Minn. Letter returned uncla former mine office, Port Arthur, Thunder Bay district, Ont. Geo. W president; E. K. Corbett, vice-president; Edwin C. Jordan, secretary urer; preceding officers, S. Enborg, David Dickie, Robt. Ferguson, Ge St. John Schulte, directors. Organized under laws of Arizona, with tion $5,000,000, shares $5 par. Lands, circa 400 acres, about 40 of Port Arthur, on the Black Bay peninsula, having lake frontage. is said by company to show a jasper-conglomerate, carrying values silver and gold, and an amygdaloid of 900' to 1,000' width carrying of 2.5% copper and $3.50 per ton in combined silver and gold val is absolutely untrue, and shows the company to be managed either who do not know the truth, or who will not tell it. Property is sa a 40' shaft and a 75' tunnel. Company formerly was promoted fro Blk., Buffalo, N. Y., from which address letters were returned unc *regarded with suspicion.*

JASPER MOUNTAIN COPPER CO. **WYOMING.**

Mine office: Douglas, Converse Co., Wyo. Idle since circa 1904.

J. BENNETT SMITH MINING CO. **MINNESOTA.**

Office: 280 Chestnut St., Kingston, Pa. J. Bennett Smith, president; Herbert Conyngham, secretary; Edw. Hilles, treasurer; Henry Hoefler, general manager. Lands, on the Lower Snake River, in Pine County, Minnesota, carry the extension of the Keweenawan copper beds of Lake Superior. Mine has pits and shafts of 20′, 40′, 110′, 150′ and 560′, on amygdaloidal and conglomerate strata carrying native copper. Company reports having expended about $50,000 on development, since 1879.

J. D. VORIS COPPER MINING CO. **COLORADO.**

Mine office: Hillside, Frémont Co., Colo. Idle several years and apparently moribund.

JEDWAY COPPER CO. **BRITISH COLUMBIA.**

Mine office: Heriot Bay, Queen Charlotte Island, B. C. Property, sundry claims held under $125,000 bond and lease, produced some ore of fair grade in 1907. Presumably idle.

JEFFERSON-CALHOUN MINING CO. **COLORADO.**

Office: Chicago, Ills. Mine office: Russell Gulch, Gilpin Co., Colo. Louis D. McCall, president; Alfred M. Stearns, vice-president; W. S. Calder, secretary. Organized under laws of Colorado, with capitalization, $3,000,000, shares $1 par, apparently as a reorganization of the Wabash Consolidated company. Lands, 7 patented claims, reached by the Newhouse tunnel. Plans sinking a 1,000′ shaft.

JEFFERSON COPPER CO.

Dead. Was a swindle, promoted by the notorious Wm. F. Wernse gang, of St. Louis. Had a name, but never enjoyed a local habitation, property being purely imaginary.

JEFFERSON COPPER-GOLD MINING CO. **COLORADO.**

Office: 1419 Schofield Bldg., Cleveland, Ohio. R. A. Gurley, president and general manager; S. Bender, vice-president; F. E. Carr, secretary; E. A. Hermen, treasurer; preceding officers, Francis L. Judd, W. E. Hayes, C. S. Carr, A. Grove and E. E. Carr, directors. Organized under laws of Colorado, with capitalization $1,000,000, shares $1 par. Lands, 180 acres, in the Bear Creek district of Jefferson County, Colorado, showing 6 veins, reported as fissures in diorite, of 21′ average width, carrying chalcopyrite with 1.5 oz. silver and $10 to $14 gold per ton, opened by a 78′ shaft. Company states that veins carry about 2% copper down to the 125′ level, followed by average values of about 7% to the 350′ level, there reaching the base zone, carrying 3 to 4% copper.

JEFFERSON COPPER MINING CO. **COLORADO.**

Dead. Was a swindle, perpetrated 1900, by the notorious W. C. Calhoun, of Denver. Merged into the Zanesville company, circa 1901, latter merged, circa 1902, in the Wabash Consolidated. Formerly at Golden, Jefferson Co., Colo.

JEFFERSON COUNTY MINING CO. **MONTANA.**

Letter returned unclaimed from former mine office, Basin, Jefferson Co., Mont. Was organized for the purpose of leasing the mine of the Basin & Bay State Mining Co. Seems complicated, somehow, with La France Copper Co. Idle and apparently moribund.

JEFFERSON-MONTANA COPPER MINES CO. **MONTANA.**

Office: care of Clarence K. McCornick, vice-president and general manager, Salt Lake City, Utah. Letter returned unclaimed from former mine office, Corbin, Jefferson Co., Mont. Arthur H. S. Bird, president and superintendent; C. H. Post, *secretary and treasurer*; preceding officers, H. A. Mc-

Cornick and B. T. King, directors. Organized, 1904, under laws of Utah. a twin of the Corbin-Montana Mines Co. Lands, circa 20 claims, showin veins and having a 310′ shaft. Did some diamond drilling, 1905. Comp said to have given a 3-year bond and lease, circa June, 1908, to Chas. Hug Alfred Cribben and L. C. Cribben, of Denver.

JEFFS LAND CO. MICHIGA

Office and mine: Rockland, Ontonagon Co., Mich. Lands, 800 acres, no and west of Rockland, on which some exploring was done, 1899-1900. Fu described Vol. I.

JELDNESS COPPER CO. NEVAD

Dead. Organized circa 1906, with capitalization $1,000,000, shares $5 p Formerly at Ely, White Pine Co., Nev.

JELM TOWNSITE & MINING CO. WYOMIN

Dead. Formerly at Jelm, Albany Co., Wyo. Described Vol. VII.

SOCIEDAD MINERA JENERAL LAS HERAS DE CABEZA DE VACA. CHIL

Office: Santiago de Chile. Mine office: Copiapó, Copiapó, Chile. O ganized Jan. 14, 1907, under laws of Chile, with capitalization 240,000 pes shares 100 pesos par.

JENNIE DELL MINING CO. MONTAN

Dead. Succeeded, 1905, by Columbus-Butte Mining Co. Formerly Butte, Silver Bow Co., Mont.

JEROME-ARIZONA COPPER CO. ARIZON

Office: care of Hon. Reese M. Ling, Prescott, Ariz. Mine office: Jerom Yavapai Co., Ariz. Organized June, 1907, under laws of Arizona, with capita zation $5,000,000, shares $5 par. Lands are 4 miles northeast of Jerome.

JEROME CAÑON COPPER CO. ARIZON

Office: 106½ South Broadway, Los Angeles, Cal. Mine office: Jerom Yavapai Co., Ariz. J. W. Tibot, president; G. B. Tibot, secretary; Jos. Smith, superintendent. Organized 1901, under laws of Arizona, with capita zation $1,000,000, shares $1 par. Lands, 16 claims, including the Copp Glance group, 14 miles northwest of Jerome, showing a vein ranging fro 2′ to 7′ width, with circa 1,500′ of openings, with ore assaying up to 25 copper, 60 oz. silver and $110 gold per ton. Had steam power, air-compress power drills, hoist and pumps. Information refused and company apparen moribund.

JEROME COPPER CO. ARIZON

Dead. Succeeded, 1902, by Cleopatra Copper Co. Formerly at Jerom Yavapai Co., Ariz.

JEROME MINES DEVELOPMENT CO. ARIZON

Dead. Succeeded the Verde Chief Copper Co., and was succeeded, 19 by Haynes Copper Co. Formerly at Jerome, Yavapai Co., Ariz. Describ Vol. VI.

JEROME SILVER-COPPER MINES CORPORATION. ARIZON

Dead. Formerly at Jerome, Yavapai Co., Ariz.

JEROME VERDE COPPER CO. ARIZON

Office: 804 Flatiron Bldg., New York, N. Y. Mine office: Jerome, Ya pai Co., Ariz. Wm. Welles Bosworth, president; Thos. E. Campbell, vice-pr dent; Leland S. Stillman, secretary; I. Mabbet Sutton, treasurer; preced officers and Thos. E. Campbell, directors; Dr. Ernest A. Haggott, consulti engineer; Eli Barrett, superintendent. Organized circa January, 1907, un laws of Arizona, with capitalization $5,000,000, shares $1 par, as successor the Verde Queen Copper Co., giving old shareholders of the Verde Qu *$2,501,000* escrowed stock of the new company, this amount being a cont

Lands, 28 claims, patented, area 486 acres, said to be encumbered by

mortgage, lying northeast of the United Verde and adjoining the United
Extension, showing an iron gossan with outcrops of copper ore on the
and Columbia claims. The Columbia has a 475′ two-compartment shaft,
about 2,000′ of workings, showing mainly copper carbonates, with small
ities of oxide and silicate ores, average assays from which are reported
% copper, but a mine, if found, will be at greater depth. Has a number
uildings and a 35-ton smelter, out of commission since 1904, which pro-
d 3 carloads of matte, when operated by the Verde Queen. Property was
for several years, until taken over by present company. Company was
oted by the General Securities Co., Los Angeles, Cal., and Wm. V. Holley
., New York, former offering the stock as absolutely guaranteed, which
ssarily causes it to be looked upon with suspicion. Company has been
ised severely in Jerome because of the extravagant nature of its adver-
g. Company claimed, July, 1907, to have about $35,000 in its treasury, in
and securities. The questions naturally arise as to what proportion may
been in cash, and the value of the securities. Company is not regarded
rably.

SIE BELLE MINING, MILLING & SMELTING CO. **CALIFORNIA.**

Office: 302 Lankershim Bldg., Los Angeles, Cal. Mine office: Daulton,
era Co., Cal. W. H. Sallada, president; W. T. Carter, secretary; D. J.
enter, lessee. Organized 1902, under laws of Arizona, with capitalization
0,000, shares $1 par. Lands, 3 patented claims, area 40 acres, with a
main shaft showing 4 fissure veins, carrying oxide, carbonate and sulphide
, assaying 15 to 20% copper, 6 oz. to 10 oz. silver and $8 to $15 gold per
Has steam power, air-compressor and a 30-ton concentrator. Has shipped
entrates of about $40 per ton average gross value.

SIE COPPER MINING CO. **UTAH.**

Office: care of Clark L. Whitney, secretary, Salt Lake City, Utah. Mine
: Dixie, Washington Co., Utah. Wm. Scowcroft, president; Andrew
nsen, vice-president; John Q. Critchlow, treasurer; preceding officers,
t. G. McQuarrie, J. H. Garrett and Albert Scowcroft, directors. Organized
, under laws of Utah, with capitalization $60,000, shares 10 cents par.
s, 5 claims, in the Tutsagubet district, having a few feet of openings
ing ore up to 68% in copper tenor.

SSIE MINES CO. **ARIZONA.**

Mine office: Poland, Yavapai Co., Ariz. John S. Jones, president and
eral manager; Harry Brisley, vice-president; Allan Hill, secretary; E. J.
lerne, treasurer; preceding officers, Jesse T. Jones, J. J. Shaw, L. W. Smith,
ley Caldwell and Nelson Dresbach, directors. Organized under laws of
ona, with capitalization $2,500,000, shares $1 par. Mine has a 667′ shaft,
is claimed to have produced upwards of $750,000 in gold, under former
nership. Receiver was appointed October, 1905, and discharged June, 1906.
pany claimed to have 150,000 tons of ore blocked out for mining, worth
conservative estimate, $2,000,000, which, of course, was untrue, and paid
tterly dividends of 3% while peddling shares. President Jones and F. D.
er, agent for the company, were indicted for using the mails to defraud,
cases were nolle prossed, and the management considers this a vindication.
nagement is said to plan building a 50-ton reduction plant. Is viewed
deep suspicion as a mere bit of stock-jobbery, notwithstanding the suc-
of its promoters in escaping jail.

SSIE WEIMER MINING CO. UTAH.

Mine office: Callao, Juab Co., Utah. Presumably idle.

NA JESÚS MARIA DE BAQUERÁCHIC. MEXICO.

Mine office: Lluvia de Oro, Batopilas, Chihuahua, Mex. Is an old prop-

once important, having copper sulphides carrying circa 5 oz. silver and $2 g
per ton. Presumably idle.

JICARILLA MINING & REDUCTION CO. NEW MEXI

Letter returned unclaimed from former office, 108 La Salle St., Chica
Ills. Mine office: Jicarilla, Lincoln Co., N. M. Geo. E. Emery, preside
H. G. W. Reinhardt, secretary; Wm. A. Franklin, manager; J. L. Walsh, m
superintendent. Lands are developed by a shaft showing gold-silver-cop
ores. Has steam power and a 15-stamp mill. Idle and apparently moribu

J. I. C. MINING CO. UTA

Office: Salt Lake City, Utah. Mine office: Park City, Summit Co., Ut
G. D. B. Turner, general manager; N. A. McLean, superintendent. Is co
trolled, through stock ownership, by the West Quincy Mining Co. Lands, ne
Daly-West and Daly-Judge, have a 625′ shaft.

JIMULCO MINING CO. MEXIC

Office: care of City Brewery, San Antonio, Tex. Mine office: Ot
Viesca, Coahuila, Mex. Otto Wahrmund, president; O. S. Newell, vice-pre
dent; S. G. Newton, secretary; John J. Stevens, treasurer; S. D. Bridge, ge
eral manager; Arthur L. Tuttle, general superintendent; John B. Moor
superintendent; Sidney P. Tyler, mine superintendent.

Organized 1901, under laws of Texas, with capitalization $500,000, shar
$50 par, increased March, 1906, and reduced, 1908, to $1,000,000. Is said
have declared 6 dividends, aggregating 27% on capitalization, in 1906, and
said to have paid 6 dividends in 1907.

Lands, 111 hectares, including the Guadalupe, Casita, Reforma and Alfar
mines, opened by a 300′ shaft and 5 tunnels of circa one mile aggregate length
mine having an extreme depth of 500′, with about 6 miles of workings. Ores
mainly oxidized, are shipped to the Aguascalientes smelter for reduction, an
are said to give average returns of 15% copper, 9 oz. silver and $2 gold per ton
which figures seem unduly high.

Mine has gasoline power, and is connected, by a 5-mile narrow gauge
railway, costing $40,000, with the Mexican Central railway, at Jimulco. Pro
duction was 1,693,957 lbs. fine copper in 1904, and 3,413,735 lbs. fine copper
in 1905. Was mining circa 75 tons daily, of high grade copper ore, until
closed down October, 1907, but resumed June 1, 1908, with a force of about 15
men, again shipping ores to the Aguascalientes smelter. Property considered
valuable.

JOAQUINA GOLD MINING CO. MEXICO

Office: 327 Douglas Bldg., Los Angeles, Cal. Mine office: Real del Ca
tillo, Norte, Baja California, Mex. L. H. Mitchell, superintendent. Has auri
erous copper ores and steam plant, employing circa 25 men at last accounts.

JOHN D. COPPER MINING CO. WASHINGTON

Dead. Merged, 1902, in Ethel Consolidated Mines Co. Formerly at Inde
Snohomish Co., Wash.

JOHN DIAS MINE. CALIFORNIA

Owned by Owl Copper Mining Co.

JOHNNIE BULL COPPER MINING CO. NEW MEXICO

Dead. West Virginia charter forfeited 1902. Formerly at Steins, Gra
Co., N. M.

JOHNNIE COPPER CO. NEVADA

Mine office: Johnnie, Nye Co., Nev. Presumably idle.

JOHNNIE-GREENWATER CONSOLIDATED COPPER CO. CALIFORNIA & NEV

Mine offices: Greenwater, Inyo Co., Cal., and Johnnie, Nye Co., Nev. P
T. Hickman, president and general manager; M. H. Smith, vice-president; H
H. Cook, secretary; E. H. Meuschke, treasurer. Organized under laws of Ar

apitalization $3,000,000, shares $1 par. Lands, 23 claims, area 460 groups. The Greenwater group, 4 claims, is undeveloped. The 4 claims, circa 3 miles south of Manhattan, Nye County, Nevada, rface trenching, said to show ore giving good assays. The Black-, 8 claims, near Johnnie, has 60′ of openings, claimed to show ore ll in copper and gold. Is not favorably regarded.

N MINING & MILLING CO. **COLORADO.**

ffice: Idaho Springs, Clear Creek Co., Colo. Has auriferous and s silver-lead ores, with steam power.

COPPER DEVELOPMENT CO. **ARIZONA.**

First company of this name was promoted, 1906, by the Wallace Co., of Chicago, with capitalization $3,000,000, shares $3 par. Johnson, Cochise Co., Ariz.

COPPER DEVELOPMENT CO. **ARIZONA.**

ffice: Johnson, Cochise Co., Ariz. Organized circa December, apitalization $2,000,000, by Ralph R. Wilson and E. K. Elliott, as company of same name promoted by the Wallace H. Hopkins Co., to grief. Lands, 5 claims, known as the Climax group, held under se, on which it is planned sinking a shaft.

MINES. **WASHINGTON.**

ffice: Cle Elum, Kittitas Co., Wash. Property, in the Teanaway pped a little high grade gold-copper ore, 1903, to Puget Sound resumably idle.

N MINE. **MONTANA.**

by Butte Coalition Mining Co.

N MINING CO. **MONTANA.**

Property sold, 1906, to Butte Coalition Mining Co. Formerly at r Bow Co., Mont.

E COPPER MINING CO. **MONTANA.**

eturned unclaimed from former office and mine, Saltese, Missoula Robt. H. Fraser, president; John R Lattimer, vice-president; Chas. retary and treasurer; Richard Daxton, manager. Organized 1907, of Montana, with capitalization $1,000,000, shares $1 par. Lands, nted claims, circa 14 miles from Houston railway station, having haft showing ore said to give average assays of 21% copper, 3 oz. 2 gold per ton.

E COPPER MINING & SMELTING CO. **MONTANA.**

ffice: Chouteau, Teton Co., Mont. Organized 1903, to develop e Blackfoot ceded strip. Idle and apparently moribund.

E GOLD & COPPER MINING CO. **ARIZONA & UTAH.**

203 Mining Exchange, Denver, Colo. Mine office: Basin, Grand O. B. Price, president; Herbert S. Shaw, secretary. Capitalization res 1 cent par, and company has an indebtedness of $17,000, ex-apitalization. Lands, 7 claims, area 140 acres, on Contact Moun-Le Sal district, claimed to show surface croppings carrying 4 to and $6 and upwards in gold per ton, with very slight develop-lands in Yavapai county, Arizona, described in Vol. V, but ap-s abandoned same. Was prolific of stock-selling literature but esults. Moribund.

D & COPPER MINING CO. **WASHINGTON.**

Formerly at Houghton, King Co., Wash. Described Vol. VI.

OYA. **SPAIN.**

ure of D. Manuel Vázquez López, owner, Huelva, Spain. Mine erra, Huelva, Spain. Lands, 53 hectares, showing large quantities

of cupriferous pyrite, averaging 48% sulphur. Has a 10-kilometre tram, was developing and producing on a small scale in 1906. Presumably idle.

JUANITA MINING & MILLING CO. ARIZO

Office: care of Joseph Swan, secretary, Phœnix, Ariz. Dana A. Sea president; Curtis Miller, vice-president; Rufus W. Seaman, treasurer; C Warren, superintendent. Organized March 29, 1905, under laws of Ari with capitalization $1,500,000, shares $1 par. Lands, 11 claims, in the C Cañon district, circa 17 miles south of Prescott, opened by a 100′ shaft, to show a 14′ vein of ore averaging 6% copper and $4 gold per ton. Pre ably idle.

JUKES PROPRIETARY MINES. TASMA

Mine office: Mt. Jukes, Montagu Co., Tasmania. H. S. Muir, mine m ager. Sent block samples, 1906, to the Mt. Lyell smelter. Presumably idl

JULIA DEANE MINING CO. UT

Mine office: Bingham Canyon, Salt Lake Co., Utah. David Clay, m ager, at last accounts. Has a tunnel showing gold-copper ores. Has st power. Idle some years.

COMPAÑIA MINERA JULIA DE COLLAHUASI. CHI

Office: Iquique, Chile. Mine office: Collahuasi, Tarapacá, Chile. Or ized Feb. 14, 1907, under laws of Chile, with capitalization 400,000 pesos, sh 100 pesos par.

JOSÉ BRUNO GONZALEZ JULIO. CHI

Mine office: Cajon de Maipó, Santiago, Chile. Property is La Pode group, carrying a vein paralleling veins of the Compañía Minera de Ma situated a short distance therefrom, and of the same general character. Co ores carry cobalt in connection, and are refractory, production being sm at last accounts.

JULIUS CAESAR COPPER MINING CO. MEXI

Mine office: Santa Catarina, Norte, Baja California, Mex. W. Wri manager. Has electric power and employed circa 30 men early in 1907.

JUMBO GOLD MINING CO. BRITISH COLUMI

Mine office: Rossland, Trail district, B. C. Mine shows a vein ran up to 30′ or more in width, developed both underground and open-cast, v ores carrying from $7 to $20 per ton in gross values. Has steam and elec power, air-compressor, etc. Shipped circa 12,000 tons of ore to the Gra smelter, 1904, but since idle.

JUNCTION DEVELOPMENT CO. ARIZO

Dead. Succeeded, October, 1905, by Junction Mining Co. Formerly Bisbee, Cochise Co., Ariz.

JUNCTION MINE. ARIZO

Owned by Superior & Pittsburg Mining Co.

JUNCTION MINING CO. ARIZO

Dead. Merged, circa 1907, in Superior & Pittsburg Mining Co. Form at Bisbee, Cochise Co., Ariz. Very fully described Vol. VI.

JUNIATA GOLD & COPPER CO. ARIZO

Office: 225 Laughlin Bldg., Los Angeles, Cal. Mine office: Quartz H Yuma Co., Ariz. Employs 5 men. P. W. Powers, president; E. S. Field, v president; Dalton S. Patterson, secretary; T. W. Phelps, treasurer; H. B. man, superintendent. Organized Oct. 29, 1907, under laws of Arizona, v capitalization $1,000,000, shares $1 par; issued, $679,000. Lands, 10 cla area 200 acres, in the Seneca district, opened by shafts of 20′, 50′ and showing ore said to give average assays of 14.47% copper and 26.84 oz. si per ton. Company plans deepening main shaft to 300′.

***JUPITER* MINING CO.** WYOMI

Office: Tomah, Wis. Mine office: Holmes, Albany Co., Wyo. Dr

esident; J. A. McKay, vice-president; J. W. Hancock, secretary r. Lands, sundry claims, adjoining the New Rambler, on the Idle.

S COPPER CO. **NEW MEXICO.**

Became bankrupt, and property was sold, 1907, to J. T. McLaughbeing insufficient to pay the company's debts. Formerly at doval Co., N. M. Described Vol. VII.

ER MINES, LTD. **ONTARIO.**

Sault Ste. Marie, Ont. Mine office: Dean Lake, Algoma, Ont. e. 5, 1906, under laws of Ontario, with capitalization $1,000,000. inity of Dean Lake, have a 46′ shaft, showing chalcopyrite. Pre-

NING CO. **COLORADO.**

ormerly at Central City, Gilpin Co., Colo.

PER DEVELOPMENT CO., LTD. **RHODESIA.**

Salisbury House, London, E. C., Eng. Mine office: Bulawayo, bert L. Stokes, chairman; Lord Gifford, vice-chairman; Tom Don-. Organized May 31, 1905, with capitalization £350,000, shares l, £200,007. Is affiliated with the Rhodesia Copper Co., Ltd., and Copper (B. S. A.) Co., Ltd., all three having the same officers t owners directly, or through share interests, in the Hippo mine. the Hippo mine, area 160 claims, 2 farms, area 3,000 acres, and square miles each, all on the Kafue river, in northern Rhodesia.

PER SYNDICATE, LTD. **RHODESIA.**

bsorbed, 1904, by Rhodesia Copper Co., Ltd. Formerly at Bulaia.

O COPPER MINING CO. **COLORADO.**

32 West Cedar St., Kalamazoo, Mich. Letter returned unclaimed mine office, Encampment, Wyo. H. E. Brown, president; E. S. resident; Edwin Gillis, secretary and general manager; W. C. rer. Organized Apr. 11, 1902, under laws of Wyoming, with $1,000,000, shares $1 par. Lands, 10 patented claims, area 95 Pearl district of Larimer county, Colorado, carrying 2 fissure by 28′ and 40′ shafts, showing oxide and sulphide ores assaying pper, with variable values in gold, silver, nickel and zinc. Is management as Coldwater mine, adjoining, and is permitting op to boundary line. Idle since circa 1904, and apparently mori-

INE. **JAPAN.**

y Mitsu Bishi Goshi Kwaisha.

MINES, LTD. **BRITISH COLUMBIA.**

8 Leadenhall St., London, E. C., Eng. Mine office: Kamloops, B. C. F. V. Marment, chairman; W. J. Webb, secretary; Jos. al manager. Organized Feb. 22, 1905, as successor of British loration, Ltd., with capitalization £135,000, shares £1 par. De-000 at 6%; debenture interest in arrears. Lands, 7 claims, in district, and 5 claims in the Frederick Arms district. Property ask mine, having a 600′ main shaft, with circa 1 mile of workings, siderable body of chalcopyrite, associated with magnetite, main-trating grade, carrying fair values in copper, silver and gold. cludes a 250-h. p. tandem-compound condensing engine. plant includes a 160-ton mill and a smelter, mill receiving ore by Ore is screened on grizzlies, and coarse stuff passed through a es-Farrel crusher, *going thence to ore-bins*, whence crushed ore se rolls by 2 *automatic feeders, going* thence through interme-

diate rolls and being elevated to 2 series of trommels. Sized material fr... the trommels is concentrated on Hartz jigs. Tailings from finer sizes are r... to waste, while tailings from coarse jigs and oversize from trommels are ... crushed by fine rolls and returned to the elevators. Fines from trommels p... through 3 magnetic separators, for removal of the magnetite gangue. Sands ... concentrated on 3 Buss tables, and middlings from these go to Overstr... tables. Slimes run to a series of settling tanks, products of which are co... centrated on 6 Luhrig vanners, arranged in pairs. The 50-ton smelter w... planned as first unit of a large plant. Employs circa 75 men.

KANE COPPER CO. CALIFORNI...

Mine office: Needles, San Bernardino Co., Cal. F. P. Pingree, manage... Organized, 1907, under laws of Arizona, with capitalization $1,000,000. Lan... 6 miles west of Needles, are said to show good ore.

KANGAROO HILLS MINING & SMELTING CO. AUSTRALIA.

Dead. Lands forfeited, 1907. Formerly at Kangaroo Hills, Queensland Australia.

KAN-HSIEN MINE. CHINA.

Mine office: Kan-Hsien, Kiang-Hsi, China. Tuan Fang, viceroy of the Liang-Kiang provinces, general manager. Was under development, 1907-1908, a fund of 400,000 taels having been furnished for the purpose in equal amounts by the provinces of Kiang-Hsi and Kiang-Su.

KANSAS-BURROUGHS CONSOLIDATED MINING CO. COLORADO.

Dead. Became bankrupt 1904. Formerly at Central City, Gilpin Co., Colo.

KANSAS-CANANEA COPPER CO. MEXICO.

Office: Chicago, Ills. Mine office: La Cananea, Arizpe, Sonora, Mex. David Miller, president; A. B. Wadleigh, general manager. Organized circ... August, 1908, with capitalization $1,000,000, as a merger of the Ortega Mining Co., Southwestern Mining Co., Red Cloud Copper Co., Consolidated Gold-Copper Co. and Miller Mining Co.

The Southwestern lands were 342 hectares, known as the Huerfano group, 6 miles southeast of La Cananea, said to carry an 800′ ore zone, opened by a 150′ shaft showing ores giving good assay values in copper, lead and silver.

Lands taken from the Consolidated Gold & Copper Co. were 1,729 acres, including the Chapultepec mine, area 879 acres, and the Corregidor, area 74... acres, adjoining properties, circa 6 miles southwest of Cananea, said to show a formation similar to the Capote mines of the Greene-Cananea.

KANSAS CITY COPPER MINING & SMELTING CO. COLORADO.

Office: Eighth St. & Broadway, Kansas City, Mo. Mine office: Oneco, Routt Co., Colo. Oliver W. Kroll, superintendent. Has steam and electric power, and is said to have a 40-ton smelter. Presumably idle.

KANSAS CITY DEVELOPMENT CO. MEXICO.

Office and mine: care of Geo. Woodward, secretary, Moctezuma, Sonora, Mex. Tobias Crane, general manager. Lands, 20 pertenencias, known as the Credo Liberal, having an 80′ shaft showing ore assaying up to 20% lead, 2% copper, 200 oz. silver and $7 gold. Presumably idle.

KANSAS CITY FIREMEN'S COPPER MINING & SMELTING CO.

Office: 310 Kemper Bldg., Kansas City, Mo. Location of lands, if any, unknown. Presumably moribund.

KANSAS CITY GOLD & COPPER MINING & MILLING CO. COLORADO.

Dead. Formerly at Crestone, Saguache Co., Colo.

KANSAS CITY & SONORA MINING & MILLING CO. MEXICO.

Dead. Property sold, 1903, to Ures Consolidated Mining Co. Formerly at Ures, Sonora, Mex.

KAP-SAN MINE. KOREA.

Mine office: Ko-chin-don, Kap-San, Hamgyeng, Koren. Mine was di...

covered and opened more than 1,000 years ago, by a Chinaman, ownership passing eventually to the Korean throne. Formerly was of great importance, and is said to have employed several thousand workmen, as recently as 1883. Ore occurs as large irregular masses of sulphides, mainly chalcopyrite, with a mixture of arsenopyrite and pyrrhotite, but without other gangue or contact minerals, in limestone. The district shows alternations of limestone and marl, with interbedded clay-slate and sandstone, frequently metamorphosed by intrusive granite, and overlaid by basalt flows or intruded by basaltic dykes. Deposit now worked is the third that has been found, having an extreme thickness of 20′ and known length of about 80′, with fairly defined walls. Ore as mined is assorted into two grades, rich ore averaging about 20% copper and poor ore being of 5 to 6% copper tenor, the average of both classes being 12.07% copper, 45.44% iron, 37.40% sulphur and only 0.66% silica. Production, 1906, is estimated at 625,000 lbs. fine copper.

KAPUNDA COPPER MINE, LTD. **AUSTRALIA.**

Dead. Was abortive. Formerly at Kapunda, Light Co., South Australia.

KAPUNDA COPPER MINES, N. L. **SOUTH AUSTRALIA.**

Office: Melbourne, Australia. Mine office: Kapunda, Light Co., South Australia. Troubles over title to mine apparently have been straightened out. Mine, 50 miles north of Adelaide, opened 1842, and worked circa 1879-1901, by tributors, has 8 shafts, 2 deepest being about 450′ each. Both country rock and vein matter are very soft, requiring heavy timbering, and the oxidized zone is only about 50′ in depth. Ores are oxides, carbonates and occasional native copper in the shallow oxidized zone, succeeded by high-grade sulphides. Selected ore has returned 12 to 25% copper, and second grade ore 8 to 12% copper, but some shipments, 1906, ranged above 40% in copper tenor. Mine is said to have produced upwards of $1,000,000 in the past. Suspended operations late 1907.

KARANKULSKI MINE. **TURKESTAN.**

Office, mine and works: Tashkent, Turkestan. Is a small property, worked on very primitive lines, and was a small producer at last accounts.

KARGALINSKI WORKS. **RUSSIA.**

Office and works: Orenburg, Russia. B. A. Pashkoff, owner; E. O. Terner, manager. Mine, 24 miles from Orenburg, is a very ancient property, having been worked in prehistoric times, and ores now produced are said to average circa 3% only in copper tenor. Latest reported production, 1899, was 90,474 lbs. fine copper. Smelter closed down, 1906, and mine and works practically idle.

KARTA BAY MINING CO. **ALASKA.**

Office: care of Hon. H. W. Mellen, Coppermount, Alaska. Organized, 1907, under laws of Washington, with capitalization $12,000.

KOMPAGNIE DU KATANGA. **CONGO FREE STATE.**

Office: 13 Rue Broderode, Brussels, Belgium. Edouard Despret, chairman; Odl. A. Thys, managing director; Major A. Cambier, manager; Victor Van Aelter, secretary. Organized Apr. 15, 1901, under laws of Belgium, as a subsidiary corporation of the Belgium Congo Company, with capitalization of 2,000,000 francs. Lands, 50,000,000 acres, freehold, with sundry preferential mining and railway rights. Mining property is 3 groups, known as the Kipushi, Kasomba and Pala, located on the left bank of the upper Lualaba river, showing auriferous copper ores. Development, in charge of Grey and Bullard, African managers of the Tanganyika Concessions, Ltd., has not yet passed beyond an exploratory stage, but the showing is said to be promising.

KATARSKI MINE. **RUSSIA.**

Office and mines: *care of H. Lorenz, Elizabethopol*, Russia. Produces

1899, was officially reported by the Russian Government as approxima 4,765,000 lbs. fine copper.

KATHARINE ELIZABETH CONSOLIDATED MINING CO. ARIZO

Mine office: Jerome, Yavapai Co., Ariz. Geo. O. Ford, president general manager; L. O. Ford, secretary and treasurer. Organized 1904, u laws of Arizona, with capitalization $1,000,000, shares $1 par. Lands, 4 cla in 2 groups, near Jerome Junction, in the Mineral Point district, opened b 175′ tunnel and several shafts of 25′ to 125′ depth. Out of funds and several years.

KAWADAYAMA MINE. JAP

Mine office: Sanyama-mura, Oe-gori, Awa, Japan. Ore is chalcopy associated with pyrite, averaging 4% copper, in a 2′ to 4′ vein in amphib Production, 1900, was only 14,834 lbs. fine copper. Presumably idle.

KAY MINE SMELTING CO. VIRGIN

Letter returned refused from former office, 1102-79 Fifth Ave., New Y N. Y. Mine office: Omega, Halifax Co., Va. Z. L. Kay, president and g eral manager. J. R. Wilbourne, vice-president; W. R. Wilbourne, secretary treasurer. Organized Aug. 8, 1905, under laws of South Dakota, with ca talization $1,000,000. Lands, 261 acres, freehold, 9 miles from South Bost Virginia. Company's prospectus states that mine is in a slate formati similar to Butte, which will be news in Butte, as the people there imagi the formation to be granite. Company reports 7 veins, up to 42′ in wid with aggregate width of 82′, veins being reported as 3 quarts and 4 copp glance. Any mine with 3 quarts in its overalls seems in line for a glance fr the copper. Company claims an average of 8% copper in its prospectus, a claims 6% in a direct report to the Copper Handbook, and claims to ha secured assays up to 50% copper. Has 2 shallow shafts, depth not report and, by figuring value of ore to depth of 2,500′, the management grave estimates values "in sight" at $20,403,575, which either is sheer ignorance intentional deception, presumably a little of each. Is not regarded favorabl

KEARNS CONSOLIDATED COPPER MINES CO. WYOMIN

Dead. Succeeded Apr. 18, 1904, by Keystone Mining & Development C Formerly at Downington, Carbon Co., Wyo. Described Vol. V.

KEARSARGE MINING CO. MICHIGA

Dead. Absorbed, 1897, by Osceola Consolidated Mining Co. Former at Kearsarge, Houghton Co., Mich.

BERG- UND HÜTTENWERKE KEDABEG. RUSSI

Office: care of Gebrüder Siemens, owners, Berlin, Germany. Mine offic Kedabeg, Elizabethopol, Russia. Works office: Kalakent, Elizabethop Russia.

Property is an old mine, reopened 1864, by present owners, and is variou termed the Kedabeg, Kiadebek and Kedabenski mine. Lands are on the fla of Miodagh or Copper Mountain, 26 miles from and 450′ above Dallar, t nearest railway station on the Baku line. Ore bodies are lenticular, flanked diorite on the east and diabase on the west, latter occurring as dykes cuttin quartz and diabase porphyrite, with considerable tufa. There are 16 know ore bodies, ranging in size from 6′ to 165′ in width, and from 33′ to 820′ length. Lenses do not outcrop, apexing at depths of 120′ to 400′ below su face. The lenses shade gradually into the walls, with very indistinct partin richest ore favoring the hanging-wall, as a rule. The ore is mainly chalcop rite, associated with covellite, sphalerite, pyrite and pyrrhotite, with occasion galena, chalcocite and magnetite, slightly auriferous and argentiferous, w gangue of quartz-porphyry, carrying considerable barium sulphate. The o ranges 3 to 5% in average copper tenor.

Development is almost exclusively by tunnels, and the caving system employed to some extent. The ore, broken by Siemans & Halske electric dri

is assorted on surface into 3 grades, first being smelting ore of 7% tenor, all ores of 5% or upwards being smelted; second grade ore, of 2 to 5% copper tenor, is leached, and third grade ore, carrying less than 2% copper, is sold to the petroleum refineries at Baku, for making sulphuric acid, which is used extensively in the refining of illuminating oils. Wages are low, ranging from 36 to 62 cents daily for miners, and only 26 to 32 per diem for trammers.

There are two smelters, the larger being at the mines and the smaller at Kalakent, 8 miles from Kedabeg and circa 40 miles from Elizabethopol. The works have no roofs, which seems a doubtful economy, as there are occasional explosions in times of rain. Ore reaches the works about 40% in lumps and 60% in fines. Lumps are kiln-roasted, and raggings, of ¼" to ½" size, are roasted in reverberatory furnaces, while ores under ¼" size are roasted in Gerstenhöfer kilns. Smelting is done exclusively in reverberatory furnaces, of which there are 6, circular in form, instead of oval, as formerly, 3 metres in diameter, with a depth of charge of 1 to 1.2 metres. Hearths are laid of quartz, in layers, or crushed quartz worked into a paste with water. The first-fusion product is a matte of 25 to 30% copper tenor, an average matte carrying 28.6% copper, 36.7% iron, 19.7% sulphur, 4.06% zinc, 0.85% nickel and cobalt combined, 0.10% lead, 0.05% arsenic, 0.025% silver and 0.0014% gold, with small quantities of silica, aluminum sesquioxide and barium sulphate. The first-fusion matte is broken into lumps, roasted, and blown up to blister copper of low grade, averaging 88 to 90% copper, 25 oz. silver and 1.2 oz. gold per ton, which is refined at Kalakent, product being a homogeneous copper, largely used for sheets, but less desirable for brass.

Fuel is mainly petroleum, of which circa 20,000 tons are burned annually. This is piped 29 miles, from Dalliar, on the Trans-Caucasian railway, to Kalakent and Kedabeg. Petroleum is used for general steaming purposes, for burning bricks, and for roasting, smelting and refining copper, 2,700 lbs. of crude oil being required to produce 3,600 lbs. fine copper from ore, while weight for weight of petroleum is required to refine precipitate to blister copper. The oil burned has a specific gravity of 0.882, and contains 87.4% carbon, 12.5% hydrogen and 0.1% oxygen, with a heating value of 11,700 calories. In practice it is assumed that 54 parts of petroleum, by weight, are equivalent in heating value to 100 parts of bituminous coal, or 250 parts of wood. Petroleum is sprayed into the reverberatories under high pressure.

The electrolytic refinery, at the Kalakent works, is of about 3,000 lbs. daily capacity, having two 24-kw. generators and 102 tanks, with multiple arrangement of electrodes.

The mine has not held its own as a producer during the new century, old ore bodies having been exhausted more rapidly than new lenses were opened. Production, 1900, was circa 4,500,000 lbs. fine copper, and for 1904 was only 3,966,720 lbs., while the 1907 output is estimated at 2,750,000 lbs.

KUPFERKIESBERGBAU KELCHALPE. **AUSTRIA.**

Mine office: Kelchalpe, Tyrol, Austria. Was a very small producer at last accounts. Presumably idle.

KELLER & INDIANA CONSOLIDATED SMELTING CO. **WASHINGTON.**

Office: Greensburg, Ind. Mine and works office: Keller, Ferry Co., Wash. Robt. L. Boyle, president and general manager; J. S. Badger, vice-president; Wm. J. Hollensbe, secretary and treasurer; M. C. Smith, superintendent; W. J. Himendorf, consulting engineer.

Organized Aug. 7, 1903, under laws of Washington, with capitalization $1,500,000, shares $5 par; issued, $1,100,000. Is closely allied, through stock ownership, with the Silver Creek Mining & Milling Co. Annual meeting, first Saturday of February.

Lands *include the Manila mine, 4 claims, 26 miles from a railroad, appar-*

ently held under a $60,000 bond and lease, on a $500 payment; also a 20-a reservoir and millsite, all well timbered, with a 20,000′ sawmill at the re voir. Lands are in the San Poil district, 7 miles above the Columbia Ri and 23 miles from Wilbur, the nearest railroad station, but surveys have b made for 2 railroads, through Keller. The Manila mine is said to have a of 70′ to 100′ width, traceable circa 1,000′, opened by 2 crosscut tunnels sh ing ore averaging about 4.5% copper and 4 oz. silver per ton.

Power is furnished by a dydro-electric installation, claimed to be capa of developing 1,480 h. p., having a 150-kw. Bullock generator.

The smelter, 5 miles from the mine and connected therewith by wag road, was built by R. L. Boyle & Co., under contract, Mr. Boyle being h the president of the company and the head of the firm contracting therewit which seems a peculiar arrangement. The reduction plant has a small sa pling mill and two 100-ton Allis-Chalmers blast-furnaces, one for lead and o for copper. Various dates for blowing in were given, followed by postpon ments, last date given for blowing in being Nov. 1, 1908, for which purp ore was being accumulated in October.

The company's prospectus states that Mr. Boyle's estimate, "which see to be ultra-conservative, provides for $270,000 yearly profit on the pres smelter," and that provision has been made for another 350-ton furnace, treble the present capacity. These figures indicate that the company is clined to be reckless in its estimates, bu the property is considered not devo of merit.

KELLY SMELTING & REFINING CO. MONTANA & NEW MEXIC

Mine offices: Corbin, Jefferson Co., Mont., and Kelly, Socorro Co., N. M Samuel W. Traylor, president; Louis O. Hedden, vice-president; Edgar W liams, secretary; John W. Dundee, treasurer; preceding officers, Warren C tis, Sr., Marcus L. Hewett and Samuel T. Houser, directors. Organized 19 under laws of Arizona, with capitalization $5,000,000, shares $5 par. La include the Kelly group in Socorro county, New Mexico, and the Alta gro 8 claims, near Corbin, latter carrying ore with fair copper values. Compa is said to plan two 1,000′ shafts, old workings being comparatively shall and is said to plan a 400-ton concentrator for the Alta group.

KELVIN-ARIZONA COPPER CO. ARIZONA

Office and mine: Kelvin, Pinal Co., Ariz. Organized circa 1907, by R. Dickinson, et al.

KELVIN-CALUMET COPPER MINING CO. ARIZONA

Office: 985 Drexel Bldg., Philadelphia, Pa. Mine office: Ray, Pinal C Ariz. W. E. Sharpe, president and general manager; Edwin L. Taylor, vi president; Chas. W. Gouert, secretary and treasurer; O. A. Turner, gen manager; Wm. B. Twitchell, superintendent. Organized circa July, 19 under laws of Delaware, as a merger of the Calumet Copper Mining Co. a Big Lead Mining Co., and also absorbed the Kelvin-Reduction Co.

Lands include a group near the Christmas, and holdings near the R mine, on Mineral Creek, 6 miles from Kelvin, showing limestone and porph contacts with conglomerate capping, carrying carbonates at surface and s phides at depth, former apparently amenable to leaching. The mine h shafts of 80′ and 300′, latter, the Madeline, showing high grade ores and nati copper, oxidized ores being said to average circa 3.5% copper, with s gold and silver values. Shaft is bottomed in sulphide ore.

A 4-stamp mill, on the Big Lead property, is idle. There is a 60-ton c centrator, planned to be increased to 125 tons capacity, which includes 35-ton leaching plant, built and operated on a secret process invented *H. P. McIntosh.* It was claimed that this process would do in minutes w *other processes* require hours to accomplish, but the process seems to ha

aken years to do what mills planned on regular lines do daily. Only car-onate ores have been treated, but sulphides are said to be amenable to the McIntosh process, after roasting. The mill is terraced, all material being handled by gravity, and equipment includes a 125-h. p. engine and air-com-pressor.

Production by the new process was begun September, 1906, and recovery October, 1907, from 1,118 tons of ore treated, was 41,521 lbs. fine copper, or 37.14 lbs. per ton, from ore assaying 68.6 lbs. per ton, which does not speak highly for the McIntosh process. The company claimed to have made copper for less than 7 cents per pound, which is considered poor figuring. Notwith-standing the great claims of the company for the new process, production, 1907, was only 178,516 lbs. fine copper.

KELVIN COPPER MINING CO. **ARIZONA.**

Office: 43-89 State St., Boston, Mass. Mine office: Kelvin, Pinal Co., Ariz. Idle and apparently moribund.

KELVIN REDUCTION CO. **ARIZONA.**

Dead. Lease was sold, circa 1907, to Ray Consolidated Copper Co., and mill sold, 1907, to Kelvin-Calumet Copper Mining Co. Formerly at Kelvin, Pinal Co., Ariz. Fully described Vol. VII.

KELYNACK TIN MINE, LTD. **ENGLAND.**

Office: 7 Great Winchester St., London, E. C., Eng. Mine office: Redruth, Cornwall, Eng. E. W. Gundry, chairman; A. J. Kingston, secretary. Organized Dec. 21, 1906, under laws of Great Britain, with capitalization £50,000, shares £1 par, as Western Tin & Copper Syndicate, Ltd.; name changed July, 1907, to present title. Lands include 7 setts of tin and copper lands, area 923 acres, near Redruth, and the Kelynack tin mine near St. Just, Cornwall. Copper property considered promising.

KEMP-KOMAR COPPER MINING CO. **WASHINGTON.**

Mine office: Loon Lake, Stevens Co., Wash. A. W. Kemp, manager. Has a 200' shaft, showing oxidized ores above and sulphides in lower work-ings, carrying small gold and silver values, in a 12' vein with paystreak of 4 to 5'. Carload shipments have returned 16 to 20% copper. Idle several years.

KEMPLAND COPPER CO. **CALIFORNIA.**

Office: care of H. L. Percy, secretary, Los Angeles, Cal. Mine office Keeler-water, Inyo Co., Cal. J. P. Harvey, general manager. Organized under laws of Arizona, with capitalization $1,250,000, shares $5 par. Lands [illegible], area 440 acres, including 13 claims known as the Brady-Kemp-land group, about 1 mile west of the Furnace Valley Copper Co. Lands show eminent gossan, one of the best in the district, and have a tunnel of [illegible] length. Presumably idle.

KEMPTON MINE. **UTAH.**

Office: care of Col. Enos A. Wall, owner, Salt Lake City, Utah. Mine at Bingham Canyon, Salt Lake Co., Utah. Fred Bemis, superintendent. Lode, in the West Mountain district, carry argentiferous and auriferous copper sulphides, values being mainly in lead. Has a 125-horsepower [illegible], which is antique, inasmuch as practically all the machinery is owned by the owner. The equipment includes a set of Wall corrugated steel mills for middlings, also invented by Col. Wall, 3 sets Wall [illegible] tables for concentration, and 2 Wilfley tables.

KENDRICK & GELDER SMELTING CO. **COLORADO.**

Dead. Succeeded, 1903, by San Juan Smelting & Refining Co. Silverton, San Juan Co., Colo.

KENNEBEC MINING CO. **UTAH.**

Office: care of W. J. Craig, Salt Lake City, Utah.

Salt Lake Co., Utah. S. M. Levy, general manager. Lands, circa 400 ac in the Big Cottonwood district, slightly developed by tunnel, and conside well located. Presumably idle.

KENNETT MINING CO. MONTA

Mine office: Virginia City, Madison Co., Mont. Ores carry gold copper. Has steam power and a 60-ton stampmill. Idle.

KENNICOTT MINES CO. ALASK

Office: 146-45 Broadway, New York, N. Y. Mine office: Valdez, Alas Norman Schultz, president; Stephen Birch, general manager; Geo. E. Baldw superintendent. Organized circa 1907, apparently as successor of Alas Copper & Coal Co., or as a holding company. It is understood that this co pany was formed in order to give the Guggenheim interests a 40% holdi in the property of the Alaska Copper & Coal Co., on account of the constru tion of a railroad. Property is described under title of Alaska Copper Coal Co.

KENTUCKY-ARIZONA CONSOLIDATED MINING, SMELTING & DEVELOPMENT CO. ARIZONA

Dead. Reorganized, 1906, as Kentucky-Arizona Copper Co. Formerly Cave Creek, Maricopa Co., Ariz. Fully described Vol. VI.

KENTUCKY-ARIZONA COPPER CO. ARIZONA

Office: 504 Kentucky Title Bldg., Louisville, Ky. Mine office: Cav Creek, Maricopa Co., Ariz. Wm. Vottler, vice-president; Shirley M. Crawfor secretary; Coleman R. Robinson, treasurer; Jas. D. Marlar, managing director Wm. A. Burr, superintendent. Organized Feb. 28, 1905, under laws of Arizon with capitalization $2,500,000, shares $1 par, as successor of Kentucky-Arizon Consolidated Mining, Smelting & Development Co. Lands, circa 1,200 acre include the Copper Top mine, opened by several shafts and tunnels, with abou 1,000′ of workings, showing numerous small veins of ore of rather low grad Has shipped some ore averaging 17% copper and $3 combined gold and silve values per ton, latter values being mainly in gold.

KENTUCKY GULCH MINING CO. COLORADO

Mine office: Tin Cup, Gunnison Co., Colo. Ores carry gold, silver an copper. Has steam power. Idle.

KEREMOS COPPER MINES, LTD. BRITISH COLUMBIA

Dead. Reorganized, August, 1903, as Keremos-Pontiac Mines, Ltd. Fo merly at Olalla, East Yale district, B. C. Described Vol. IV.

KEREMOS-PONTIAC MINES, LTD. BRITISH COLUMBIA

Office: 32 Broadway, New York, N. Y. Mine office: Olalla, East Ya district, B. C. Dr. A. C. Sinclair, president; G. H. Wheeler, vice-president W. H. Danby, secretary; R. W. Northey, treasurer and superintendent; pr ceding officers and Phil. Allen, Jr., directors. Organized August, 1903, und laws of British Columbia, with capitalization $2,500,000, shares $1 par. Land 16 claims, area 800 acres, in 2 groups, 1 having a ledge of 300′ claimed wid which probably is an overestimate. Another authority states that propert has a 6′ vein with an 18″ paystreak of mispickel carrying 5 to 13% copp Has a 185′ shaft and several short tunnels, with about 1,000′ of working giving ore assaying 2 to 4% copper, 2 to 4 oz. silver and $2 to $5 gold p ton. Was promoted by Wheeler & Co., of New York, who have foisted on t public a number of unsuccessful and dubious promotions. Property consider promising, but company not regarded favorably.

KEREMOS SMELTING & REFINING CO. BRITISH COLUMBI

Dead. Formerly at Olalla, East Yale district, B. C.

KESWICK SMELTER. CALIFORNI

Owned by Mountain Copper Co., Ltd.

AN CONSOLIDATED MINES CO. **ALASKA.**
ind mine: Ketchikan, Alaska. Jas. A. Davis, president. Organ- under laws of Maine, with capitalization $5,000,000. Lands, 36 Revillagigedo Island.

N COPPER CO. **ALASKA.**
Formerly at Ketchikan, Alaska. Described Vol. VII.

W ASSOCIATION. **MICHIGAN.**
33-87 Milk St., Boston, Mass. Local office: Marquette, Mich. gyear, agent. Is a land corporation, owning large tracts of lands, er Peninsula of Michigan, that are partly on the Keweenawan

W COPPER CO. **MICHIGAN.**
Had no connection with present day Keweenaw Copper Co. Organized d charter to expire 1893; wound up, 1899, and lands sold to W. K. nsing, Mich., and by him transferred, 1905, to present Keweenaw Old company owned Section 13 and East ½ Section 24, Town 58 e 28 West. Raised and expended circa $100,000. Formerly at ine, Keweenaw Co., Mich.

W COPPER CO. **MICHIGAN.**
42 Broadway, New York, N. Y. Operating office: Hancock, Mich. Mandan, Keweenaw Co., Mich. Chas. A. Wright, president and pencer R. Hill, vice-president; Capt. Thos. Hoatson, second vice- d mining director; preceding officers, Thos. F. Cole and Capt. , directors; Chas. A. Wright, Jr., secretary; Arthur H. Sawyer, tendent; Howard G. Wright, mill superintendent; John C. Shields, erintendent; Jas. T. Bryant, mining captain; W. W. Stockley,

d March 13, 1906, under laws of Michigan, with capitalization shares $25 par; issued, $5,000,000, paid in, $13. Controls, through hip, the Keweenaw Central R. R. Co., Phœnix Consolidated Cop- Washington Copper Mining Co. Adams Trust Co., Boston, regis- rust Co., Boston, transfer agent. Has circa 2,300 shareholders. ing, second Tuesday in February.

r's capitalization was purposely made much larger than immediate ments, to provide for future growth, the plans of the corporation r the absorption of large tracts of mineral lands, railroad con- ction of mills and smelters, and other work. A very considerable urchase price of lands acquired was paid in shares. In 1907 the chased a majority of the outstanding stock of the Washington g Co., and is supposed to have an option, from Dr. Léon Estivant, mine, which is separately described. Company ended 1907 with and $20,671 accounts receivable, with accounts payable of $10,87 iginally were 12,855 acres, including 11,550 acres of mining lo- rious other tracts have been added, 1,021 acres having 1907, giving total holdings, at end of 1908, of circa 17,000 al lands, carrying considerable timber. The tracts are lo- ring the strike of the Keweenawan mineral belt for ng practically all of the amygdaloidal and conglomerate the district, as well as numerous copper-bearing Town 58 North of Ranges 27, 28 and 29 West, ly named by the Mass, Copper Harbor, Eagle aw, Mandan, Mohawk, Pennsylvania & Boston es, in addition to lands controlled through operations. In addition to strictly mineral ranty deeds of mine carrying extensive

available harbors, and undeveloped water-powers of great prospective value.

The company's lands include nearly 2 miles of water frontage on either side of the Montreal river, including Fish Cove, one mile east of the river's mouth, which might be made a fair harbor at comparatively small expense. This frontage will be available for mills, and as the site of a power plant and railroad terminal. Lands also include 5 miles of the course of the river, on both banks, and, with other holdings, give the company the entire water-frontage of Mosquito Lake, which the company has rechristened Lake Medora. It would be possible to use Mosquito Lake for a storage reservoir, by throwing a dam across its outlet, and developing a great water power, with a power installation at the mouth of the river.

The company also owns the Lac La Belle, or Mendota, ship canal, one mile in length, connecting Lac La Belle with Lake Superior. This canal has a 14′ channel, which should be deepened by the federal government, as it leads to a splendid haven, which should be made a harbor of refuge.

The company owns a diamond drill outfit, and has made extensive borings, including about 20 drill-holes giving a cross section of the Resolute, Mandan, Medora and Empire tracts.

Most of the old properties secured by the company were prospects only, but the Ætna has a recorded production of 140,881 lbs. fine copper, secured 1863-1873, and the Resolute mine has a 379′ shaft, with circa 2,000′ of workings.

The Medora mine, opened about 1860, has 3 old shafts, about 100′ apart, deepest 140′, and has been reopened on an extensive scale. The Medora bed traverses the Keweenaw lands for about 4 miles, outcropping several hundred feet north of the Montreal River lode. The Medora bed, averaging about 12′ in width, is a soft chocolate-colored amygdaloid, carrying considerable prehnite, calcite and quartz, in connection with fine stamp-copper and occasional heavy copper, a 30″ streak along the footwall carrying some barrel work. The lode, as a whole, is bunchy.

No. 1 shaft is 7x18′, inside measurement, with 2 hoisting compartments, each 7x6′4″, and a 7x2′8″ compartment for ladderway and pipes. The shaft is sunk partly in the bed, and partly in the trap footwall, at an angle of 23°, and the skipway is laid with 40-lb rails. Levels are opened at 150′ intervals, with sub-levels, these being required to facilitate the moving of rock, owing to the flat pitch. The shaft was 1,160′ deep, September, 1908, with 13 levels, and about 2 miles of workings. It is planned to sink the shaft 1,000′ deeper.

A site for No. 2 Medora shaft was selected, 1907, at a point 1,900′ west of No. 1, which location was changed to a point circa 1,200′ west of No. 1, when No. 2 shaft was started, July, 1908.

In addition to the Medora amygdaloid the property carries other cupriferous beds, among these being the Medora fissure vein, which outcrops circa 225′ east of No. 1 shaft, but makes into the shaft with depth. About 100′ south of the Medora is another amygdaloidal bed, carrying copper in small quantities, and to the northward is the Wolverine amygdaloid and Allouez conglomerate. The latter was reached, 1908, by a 230′ north crosscut from No. 1 shaft, the conglomerate lying about 280′ north of the Medora, with drifting in progress, September, 1908, on an amygdaloid, presumably the Wolverine bed, of about 15′ width, from which it is expected to make a mill-test.

Equipment at No. 1 shaft includes a shaft-rockhouse with Blake crusher and Lake Shore engine. There is a 24x30′ engine-house, with a 14x18″ Lidgerwood reversible link-motion hoist, good for 1,000′ depth, also 10-drill and 18-drill Ingersoll-Sergeant straight-line compound air-compressors, and a 24x48′ boiler-house.

Buildings at the Medora include a 22x28′ machine-shop, 20x30′ smithy, *24x30′ office*, 26x42′ changing-house and about 20 dwellings. Water is supplied

a 4" pipe-line, leading from Mosquito Lake to a tank at the mine. ne and location have a telephone system.

Empire mine also carries the Medora bed, circa 3 miles east of No. , and some trenching and test-pitting, done 1906-1907, on the Empire owed a bed of about 15' width, carrying some copper at surface. The also carries the Montreal River lode, on which the Manitou has done able work.

Keweenaw Copper Co. secured control of the old Lac La Belle & railroad, which was reorganized as the Keweenaw Central R. R. Co. ire stock issue of the Keweenaw Central, $350,000, is owned by the w Copper Co. The old Lac La Belle line, only 8 miles in length, ilt, and the road was extended southwest to Calumet. The line has miles of spurs and branches, and cost about $800,000. The line ends h of Centennial, a suburb of Calumet, where connection is had with er Range railroad. Equipment includes 4 locomotives, 7 passenger 82 freight cars, rock-cars being of 25 tons capacity each. Railroad 1907, was $31,806, with net earnings of $3,326.

is stamped at the mill of the Phœnix Consolidated Copper Co., separatly described, under the title of the owner. A branch of the w Central has been built to the mill.

uction was begun July 28, 1908, on the basis of 225 tons daily, about he rock being sent from the stockpile, and half from the underground , apparently little or no selection being attempted. The company no official statement as to returns secured, and estimates vary from 16 lbs. of mineral per ton. Apparently a fair estimate of returns 11 lbs. fine copper per ton, as the mineral is dressed to an unusually allic percentage. In September, 1908, production was cut to about daily, working the mill on day shift only. The Medora operates 12 ills, and the company employs about 100 men.

rently the Keweenaw Copper Co. has not yet obtained an assured the Medora, though the prospects of the property seem fair, given levelopment. The management is strong and experienced, and the owns an immense acreage of mineral lands, on which it scarcely can oned that paying mines will be developed, in time.

Y COPPER CO. **BRITISH COLUMBIA.**

: care of Capt. Andrew Wasson, president and general manager, to, Cal. Mine office: Mt. Sicker, Vancouver Island, B. C. F. W. superintendent. Property adjoins the Tyee and Lenora, and is tunnel. Has steam power. Idle.

NE COPPER CO. **ARIZONA.**

: Bank of Commerce Bldg., St. Louis, Mo. Mine office: Globe, Ariz. G. S. Maddox, president; A. A. Aal, vice-president; Geo. A. ecretary; J. R. Finletter, general manager; preceding officers, L. B. , J. N. Porter, J. J. Keehan, F. S. Sullenberger, L. L. Henry, H. P. , H. H. Harvey and S. A. Arkills, directors.

, 12 claims, 8 miles west of Globe, lying next east of the Live Oak the Inspiration and Miami mines. Property shows granite and phyry, with occasional schists. East of the main workings there are posits of chrysocolla, said to assay 3 to 7% copper, and a conglome- f 4' to 12' thickness, said to be impregnated with copper to the ex to 6%, from which values apparently could be recovered by leaching eveloped, is mainly chrysocolla, with disseminated carbonates and sulphides, latter including chalcocite of 40 to 60% copper con- *ore body is a 12" vein carrying a 17" paystreak said to average*

22% copper and 2 to 5 oz. silver per ton, balance of vein carrying ore a to 5% copper tenor, which has been left standing, for extraction later.

Development is by 3 tunnels, with about one-half mile of workings, a it is planned to sink a 3-compartment 500′ shaft, for large production. No. tunnel, of 570′ length, shows chrysocolla and carbonate ores of 4 to 24% tea and No. 3 tunnel, circa 600′ long, also shows good ore.

A 25-ton experimental plant was built in 1905. The system used is modification of the Hoepfner sulphide process, and is designed for leachi chrysocolla, as well as carbonate ores, and can include sulphide ores aft roasting. Ore is reduced to fines, pulped, and leached for three hours in slowly revolving chlorination barrel. The leaching solution is cupric chlorid which is changed to cuprous chloride by the absorption of one atom of copp The enriched solution goes to precipitation tanks, where the extra molecu of copper is precipitated upon large copper sheets, and the solution, thus r generated to cupric chloride, is returned to the storage tank, for further us

Some grading was done, 1906, for a 100-ton roasting furnace, to enab the mine to treat sulphide ore, but the furnace was not built.

The Keystone has been a shipper for 10 years, and production, 1899-190 was 1,067 tons of ore, netting $37,276.98. Ores smelted gave returns of 22 27% copper, in addition to lower grade silicious ores of 3 to 5% copper tena sent to the Old Dominion smelter for converter linings.

The company came to grief in 1907, and control of the property has be shifted several times. The Old Dominion Mining & Smelting Co. plann taking over the property, 1908, under foreclosure proceedings based on $65,000 mortgage, but the stockholders voted, May, 1908, to accept the off of Nathan L. Amster to pay the $65,000 mortgage and expend $50,000 on d velopment and afterwards reorganize the company. Although this agre ment was ratified it was not carried out, and the Amster option was tra ferred, apparently without Amster's sanction, to J. B. Newman, who paid t $65,000 judgment and agreed to expend $4,000 monthly on development, wi the proviso that he may acquire title by paying $400,000 to the company.

Production, 1907, was 208,801 lbs. fine copper. Property is considered cidedly promising.

KEYSTONE COPPER & GOLD MINING CO. **ARIZON**

Office: 502 Park Bldg., Pittsburg, Pa. Letter returned unclaimed fr former mine office, Wickenburg, Maricopa Co., Ariz. C. B. McLean, pr dent; W. J. Strassburger, secretary and general manager; W. W. Wils treasurer. Organized 1900, under laws of Arizona, with capitalizat $1,250,000, shares $10 par. Lands, 24 claims, in the Blue Tank and Black Bo districts, showing sulphide ore bodies. Idle for several years and apparen moribund.

KEYSTONE COPPER MINING CO. **NEW MEXI**

Office: Bloomsburg, Pa. Mine office: Tres Piedras, Taos Co., N. Lands, 18 claims, known as the Payroll mine, in the Bromide district, ope to depth of about 250′ and showing a vein of sulphide ore said to be 20′ w and to assay 6 to 12% copper, with fair gold values. Has steam power a 50-ton concentrator. Idle several years and apparently moribund.

KEYSTONE COPPER SMELTER CO. **MEXI**

Office: 330 Drexel Bldg., Philadelphia, Pa. General Mexican off Apartado 22, Guadalajara, Mexico. Mine office: Tapalpa, Sayula, Jali Mex. Robert P. Molten, president; Edward E. Cattel, vice-president chairman of executive committee; Aubrey F. Lee, secretary; Daniel Lam *Jr., treasurer;* Theo. Breidenbach, general manager. Organized under *of New Jersey,* with capitalization $300,000, increased, July 6, 1905, to $50

shares $1 par. Has authorized an issue of $100,000 certificates of indebtedness, at 6% interest, redeemable Dec. 10, 1908.

Lands, circa 100 hectares, in 5 groups including the Mexicana, America and Palma groups, also timber rights to circa 50,000 acres of adjoining lands. Principal development is on La Mexicana group, area 82 hectares, 15 miles west of Tapalpa, mine being developed by a 200-metre crosscut tunnel, cutting 4 veins, with about one mile of workings. Veins are fissures in porphyry, averaging 5' width, and carrying auriferous and argentiferous chalcopyrite, sphalerite and pyrite.

Equipment includes steam and electric power. There is a 30-ton mill, having 2 crushers, 2 rolls and 3 concentrating tables. A small smelter, built circa 1902, had a 75-ton reverberatory furnace, making matte of 30 to 48% copper tenor, when operated, which was for a short time only, and the smelter was abandoned several years ago. It was planned to add a cyanide plant for treatment of gold ores, but apparently this was not done. Early 1908 company bought the Etzatlán smelter, of 30 tons daily capacity, and is said to plan removing same to Talpalpa. The reduction plant was remodeled and put in operation early 1908. The company is said to employ about 100 men.

KEYSTONE-MERRITT COPPER CO. **ARIZONA.**

Letter returned unclaimed from former mine office, Clifton, Graham Co., Ariz. Was to have been absorbed, 1907, by Copper Co. of Arizona, since succeeded by Coppermines Co. of Arizona. Idle and apparently moribund.

KEYSTONE MINING & DEVELOPMENT CO. **COLORADO & WYOMING.**

Office: 839 Equitable Bldg., Denver, Colo. Mine offices: Downington, Carbon Co., Wyo., and Boulder, Boulder Co., Colo. Dr. E. T. Ettinger, president and general manager; Wm. R. Klein, secretary; G. C. Aschbach, treasurer. Organized Apr. 18, 1904, under laws of Wyoming, with capitalization $2,000,000, shares $1 par, as successor of Kearns Consolidated Copper Mines Co. Has lands in Colorado and Wyoming. Former, carrying gold only, include the Smoky Hill mine, area 20 acres; Dirigo mine, area 60 acres, patented, and the Norumbega mine, area 40 acres, all in Boulder county. Principal development seems to be on the Colorado gold properties. The Wyoming lands, area 206 acres, are on Beaver Creek, circa 12 miles south of Encampment, including the Kearns mine, opened by a 600' tunnel, and the 160-acre Downington townsite. Idle.

KEY TO SUCCESS COPPER MINING, SMELTING & EXPLORATION CO., LTD. **UTAH.**

Office: 213 Providence Bldg., Duluth, Minn. Letter returned unclaimed from former mine office, Frisco, Beaver Co., Utah. A. R. Merritt, president; C. E. Mylen, vice-president; Geo. F. Davis, secretary; J. S. Lane, treasurer; traveling officers, H. Brown and John L. McGilvery, directors. Organized 1902, under laws of South Dakota, with capitalization $1,500,000, shares $1 par. Lands, 12 claims, area 240 acres, also a 40-acre millsite, in the Beaver Lake district, opened by shafts of 25', 75' and 105', showing ore carrying 3 to 5% copper, with gold and silver values. Idle, and August, 1908, planned reorganization.

KEY WEST MINING CO. **NEVADA.**

Mine office: Bunkerville, Lincoln Co., Nev. Ores said to carry copper, nickel and platinum. Idle.

KHAYYAM COPPER CO. **ALASKA.**

Dead. Merged, circa 1904, in Omar Mining Co. Formerly at Kiam, Alaska.

KIADEBEK MINE. **RUSSIA.**

Owned by Berg- und Hüttenwerke Kedabeg.

KILLINGDAL KOBBERVAERK. NOR

Owned by Bede Metal & Chemical Co.

KIMBALL CREEK MINING CO. WASHING

Dead. Formerly at Berlin, King Co., Wash.

KIMBERLEY SYNDICATE. WESTERN AUSTRA

Office: Adelaide, South Australia. Mine office: Derby, Western tralia. Lands adjoin the Derby Copper Syndicate, of which the Kimberle a twin. Has surface ore of high grade with country rocks of slate and sc Made a small shipment of 20% ore to smelter at Moonta, South Austra late 1906.

KIN-E-CHY MINING & MILLING CO. ARIZON

Office: 1112 Majestic Bldg., Detroit, Mich. Mine office: Willcox, Cochi Co., Ariz. J. Geo. Zink, president; Dr. W. E. Burtless, vice-president; Fred Obenauer, secretary and treasurer; Gust. Becker, manager; preceding office and Herman Knorr, directors. Organized 1903, under laws of Arizona, wi capitalization $1,000,000, shares $1 par.

Lands, 33 claims, area 660 acres, in 5 groups, in the Aravaipa distri showing several fair sized veins carrying variable values in copper, lead, s ver and gold. The copper group, of 14 claims, has a 72′ shaft and a 15 tunnel. The gold group, of 6 claims, is said to show a considerable body low grade gold ore. Equipment includes steam power and a small stamp-mi built 1903. Idle, unable to pay its bills and apparently moribund.

KING COPPER MINING CO. OF NEVADA. NEVAD

Office: 431-53 State St., Boston, Mass. Letter returned unclaimed from f mer mine office, Lovelock, Humboldt Co., Nev. Property was the Anderson min carrying auriferous and argentiferous copper ores, slightly developed. La idle and apparently moribund.

KING DAVID MINING CO. UTA

Office: Salt Lake City, Utah. Mine office: Frisco, Beaver Co., Ut David Evans, manager. Organized circa August, 1908, and said to have beg business with $50,000 in the treasury. Lands are circa 70 claims, near t Horn Silver mine. Company plans a 2-compartment 1,000′ shaft, on the s posed extension of the Horn Silver vein, and is said to have ordered a ho good for 1,500′ depth. Has a 5-mile pipe-line for water, and begun wo vigorously, with a force of about 60 men.

KING DEVELOPMENT CO. ARIZON

Dead. Merged, circa 1904, in Consolidated King Development & Colu bia Copper Mining Co. Formerly at Jerome, Yavapai Co., Ariz.

KING EDWARD MINES, LTD. BRITISH COLUMBI

Office and mine: Fairview, Boundary district, B. C. R. H. Parkins president; H. Jones, vice-president; D. Braithwaite, secretary and treasur preceding officers, D. A. Carmichael and W. A. Hainig, directors. Organiz January, 1904, under laws of British Columbia, with capitalization $500,0 shares $1 par. Lands, 10 claims, area 500 acres, in the Similkameen divis of the Osoyoos district, opened by 350′ of workings, show a sulphide ore b of 6′ to 10′ width, estimated to average 5% copper and about $1.50 per ton combined gold and silver values.

KING EDWARD MINING CO. ONTAR

Dead. Lost lands. Formerly at Thessalon, Algoma Ont. Fully descri Vol. VII.

KING GOLD & COPPER MINING CO. WASHINGTO

Office: Davenport, Wash. Mine office: Springdale, Stevens Co., *J. B. Tuttle*, Sr., president and general manager; J. T. McAviney, vic *dent; J. B.* Tuttle, Jr., secretary and treasurer; preceding officers, A. M.

bell and G. B. M. Seager, directors. Organized June, 1900, under laws of Washington, with capitalization $2,000,000, shares $1 par.

Lands, 9 miles west of Springdale, known as the Edna-Gladiator group, carry a contact vein between diorite and quartz, opened by a 370' shaft, showing low-grade melaconite and chalcocite, with silicious gangue. Equipment includes a 350-h. p. boiler, 10x11" friction hoist, 8-drill air-compressor, power drills, steam pumps, electric light plant and various engine-houses, shaft-houses, bunk-houses and ore-bins.

Suit brought by dissatisfied shareholders, alleging mismanagement, was dismissed September, 1905, the court holding that allegations were not proven. Not regarded favorably. Presumably idle.

KING GOLD & COPPER MINING & MILLING CO. CALIFORNIA.

Dead. Was a swindle. Formerly at Victor, San Bernardino Co., Cal. Fully described Vol. V.

KING KENDALL MINING CO. NEW MEXICO.

Dead. Formerly at Steins, Grant Co., N. M.

KINGMAN SMELTING & REFINING CO. ARIZONA.

Dead. Was succeeded by Union Smelting Co. Formerly at Kingman, Mohave Co., Ariz.

KING MINING CO. WYOMING.

Dead. Was a twin of the Isabel Copper Mining Co. Lands were sold, 1902, to Rambler Mining & Smelting Co. Formerly at Riverside, Carbon Co., Wyo. Described Vol. VI.

KING MINING CO., LTD. BRITISH COLUMBIA.

Dead. Reorganized, circa 1903, as Denoro Mines, Ltd. Formerly at Slocan, Slocan district, B. C.

KING PHILIP COPPER CO. MICHIGAN.

Office: 701-199 Washington St., Boston, Mass. Operating office [illegible], Mich. Mine office: Winona, Houghton Co., Mich. Chas. J. [illegible], president; Geo. P. Gardner, vice-president; preceding officers, Walter [illegible], Rufus R. Goodell, Nathaniel H. Stone and Nathaniel Thayer [illegible]; Edward B. O'Connor, secretary and treasurer; Dr. L. L. Hulbert [illegible]; Alex R. Seeber, superintendent; Frank G. Lukey, clerk.

Organized Nov. 13, 1905, under laws of Michigan, with [illegible] $2,500,000, fully issued; $7 paid in. Is controlled, through [illegible] shares, by St. Mary's Mineral Land Co. City Trust Co. [illegible]. A $1 assessment was levied circa August, 1908. Company has $20,167 cash and accounts receivable, and $16,545 accounts [illegible].

Lands, 1,040 acres, in Houghton and Ontonagon counties, Mich., in tract lying about one mile south of the Winona mine [illegible] parcels of 5 acres with the Winona Copper Co. to [illegible] permitting each to work to better advantage in shafts [illegible]. The lands have been quite thoroughly probed by diamond drills [illegible].

The Winona lode averages about 20' in width [illegible] lands, and shafts are sunk in the footwall, which [illegible] mine is to be connected, eventually, with the [illegible] on the same planes. Ten power drills are working [illegible] ground. Frames for drifts are built of heavy [illegible] covered with light lagging, after which waste [illegible] and above the lagging, leaving drifts with [illegible].

The first shaft was started 1,500' from [illegible] but struck quicksand at 32' depth, hence [illegible]. A new shaft started 75' distant, latter being [illegible] started vertically, of *size 14x25', and* [illegible] *30', after which the shaft is deflected* [illegible].

[illegible]AY.

De-

[illegible]USTRIA.

[illegible] idle.

[illegible]NSVAAL.

[illegible]. Simpson, [illegible]. under laws [illegible]ued, £45,157, for £500 cash [illegible].

the dip of the bed, though about 85′ in the footwall. No. 1 was bott August, 1908, at the tenth level, and crosscuts have been driven to the Wi bed on the fifth to ninth levels, inclusive, showing fair ground.

No. 2 shaft, circa 2,800′ southwest of No. 1, is on the south side of S ing River, and was 360′ deep August, 1908, with a crosscut on the fourth to the Winona bed, which gave about the same showing as in No. 1.

Equipment includes a 12x20″ hoist with 5′ drum, good for 1,200′ de and a powerful electric hoist. The King Philip will take electric power f the Winona, and in return will furnish compressed air. The 28x40′ po house contains a battery of two 200-h. p. Parker tubular boilers, 6-drill 15-drill air-compressors and a powerful Nordberg triple expansion 3-stage compressor. Coal is drawn to the boiler-house through a concrete tun under a coal-trestle surmounted by a railroad track.

Buildings include a 34x40′ power-house, 15x24′ smithy, 26x36′ warehou 24x62′ bunk-house, 20x50′ cook-house, 16x30′ change-house, 24x36′ office a about a dozen other structures.

Little attention has been paid to the character of copper-bearing b efforts being centered on sinking and equipping the shafts, hence little can said as to the company's prospects, but it is to be presumed that the co pany, which has an excellent and experienced management, possesses accura data upon which to predicate its extensive development.

KING & QUEEN COPPER CO. **NEW MEXIC**

Mine office: Steins, Grant Co., N. M. Lands, sundry claims near t King Kendall and Johnny Bull mines. At last accounts contemplated devel ment.

KING & QUEEN MINING CO. **MONTAN**

Office: 1007 Bessemer Bldg., Pittsburg, Pa. Mine office: Superior, M soula Co., Mont. Nelson Weddle, Jr., president; Chas. J. Rieger, vice-pr dent; J. F. Hinckley, secretary; H. A. Spangler, treasurer; preceding offic B. H. Howard, J. L. Armstrong, R. W. Judkins and Dr. G. T. McCullo directors; T. E. Wood, superintendent. Organized Feb. 22, 1905, under l of Montana, with capitalization $1,000,000, shares $1 par, practically as a construction of the Montana Mining & Development Co.

Lands, 15 claims, partly patented, area 188 acres, and a 20-acre mill well timbered, 3½ miles from the Northern Pacific railway, in the Spr Gulch district, showing limestone, quartzite and shale, with 5 contact depo between quartzite and limestone, of which one, under development, of 8′ mated average width, formerly was reported as giving average assays of 6. copper, 16% lead, and 16 oz. silver per ton, from malachite, chalcocite chalcopyrite, and is now said to average about 4.5% copper and 12 oz. si per ton, with gold values ranging up to 8 oz. per ton. Development is b 1,200′ tunnel and a 600′ shaft, mine having about 3,000′ of workings, show considerable ore.

Equipment includes an 80-h. p. boiler, 25-h. p. hoist, 6-drill duplex compressor, a sawmill of 6,000 feet daily capacity, and several small b ings. Property was a small producer, for about 10 years, before bought present owners. Was idle September, 1908, but planned early resumption.

KING SOLOMON MINES. **BRITISH COLUMB**

Office: care of J. S. H. Matson, Victoria, B. C. Mine office: Cowic Vancouver Island, B. C. Wm. Lewis, superintendent. Organized 190 capitalization $15,000, shares $1,500 par. Lands, 4 miles from the Esquim & Nanaimo Railroad, on Copper Mountain, in the Helmken district, inc *the King Solomon* and Queen of Sheba claims. Has made several 40 and 50 *shipments to Tyee* smelter that returned 8 to 9% copper.

KING SOLOMON MINING CO. **BRITISH COLUMBIA.**

Office: care of D. C. Corbin, owner, Spokane, Wash. Letter returned unclaimed from former mine office, Greenwood, Boundary district, B. C. Lands, near the Montreal & Boston claims of the Dominion Copper Co., Ltd., produced, 1902, circa 700 tons of ore. Idle some years.

KING SOLOMON'S COPPER MINES. **TRANSVAAL.**

Mine office: Zeerust, Transvaal.

KING SOLOMON TUNNEL & DEVELOPMENT CO. **COLORADO.**

Office: care of Samuel H. Alexander, secretary, Madison, Wis. Mine office: Frisco, Summit Co., Colo. F. C. Dinsmore, president; W. W. Theobald, treasurer. Jas. H. Myers, superintendent. Organized under laws of South Dakota, with capitalization $2,500,000, shares $1 par, as successor of King Solomon Tunnel Mining Co. Lands, 50 lode claims and sundry placer claims. Has an air-compressor.

KING SOLOMON TUNNEL MINING CO. **COLORADO.**

Dead. Reorganized as King Solomon Tunnel & Development Co. Formerly at Frisco, Summit Co., Colo.

KINGSTON GOLD & COPPER MINING CO. **BRITISH COLUMBIA.**

Mine office: Hedley, Boundary district, B. C. Lands, 4 claims, 1 fractional, showing slightly auriferous and argentiferous chalcopyrite and galena, partially developed by open-cuts and several short tunnels.

KING WILLIAM MINING CO. **UTAH.**

Office: Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. Jas. H. Blanchard, president; J. H. Rouse, vice-president; A. C. Ellis, Jr., secretary; L. H. Farnsworth, treasurer. Organized under laws of Nevada, with capitalization $1,250,000, shares $1.25 par. Lands are near the Eagle & Bell, and it is planned developing the King William from the workings on that property.

KIRK LEASING CO. **UTAH.**

Mine office: Bingham Canyon, Salt Lake Co., Utah. Morris P. Kirk, general manager. Organized circa October, 1908, to operate property leased from Boston Consolidated Mining Co.

KISHORN MINE. **SCOTLAND.**

Office and mine: care Mrs. M. M. H. Stewart, Kishorn, Loch Carron, Ross-shire, Scotland. Mine was worked about the close of the Eighteenth or beginning of the Nineteenth Century, but since idle, except for development in 1901, with circa 80 men, for a short time in 1904.

KITTANNING COPPER MINING CO. **WASHINGTON.**

Dead. Formerly at Index, Snohomish Co., Wash.

KITTICOOLA GOLD-COPPER MINE, LTD. **SOUTH AUSTRALIA.**

Dead. Lands sold, 1906, to Port Lincoln Copper Co., Ltd. Formerly at Fly Creek, Robe Co., South Australia. Described Vol. VI.

KITTICOOLA MINE. **AUSTRALIA.**

Owned by Port Lincoln Copper Co., Ltd.

KLI MINES, LTD. **NORWAY.**

Dead. Formerly at Reitan, Aalen, Guldalen, Trondhjem, Norway. [illegible] Vol. VI.

KLOVERWALTUNG KLAUSEN. **AUSTRIA.**

Mine office: Klausen Pfunderberg, Tyrol, Austria. Presumably idle.

KLEIN LETABA COPPER MINES, LTD. **TRANSVAAL.**

Office: 70 Queen Victoria St., London, E. C., Eng. Robt. [illegible] man; Victor Thomasset, secretary. Organized March 4, 1907, [illegible] Great Britain, with capitalization £60,000, shares £1 par; [illegible] 444 copper claims, in the Klein Letaba district, bought for [illegible] £40,000 in shares.

GEWERKSCHAFT KLINGENTHAL-GRASLITZER KUPFERBERGBAU. GERM

Mine office: Klingenthal, Saxony, Germany. Erhart August Sc manager. Has a 100-metre main shaft, developing chalcopyrite, empl about 100 men.

KLIPKOP (NAMAQUALAND) COPPER SYNDICATE, LTD. CAPE COLO

Dead. Voluntarily liquidated, 1904. Formerly at O'okiep, Little Na qualand, Cape Colony.

KNAPP MINING CO. COLORA

Mine office: Pearl, Larimer Co., Colo. Is controlled, through st ownership, by National Mining & Milling Co. Lands, 9 claims, area 80 ac known as the Big Horn group, carrying 2 fissure veins in gneiss and dior opened by shafts of 65′ and 85′, showing chalcopyrite and occasional bor Has a 25-h. p. steam hoist. Idle.

KNICKERBOCKER DEVELOPMENT CO. MONTAN

Dead. Formerly at Helena, Lewis & Clark Co., Mont. Described Vol. V

KNICKERBOCKER MINING CO. MONTAN

Mine office: Butte, Silver Bow Co., Mont. Organized 1906, with capit zation $5,000,000, shares $5 par, to take over the Jennie Dell and adjoin claims.

KNIGHT COPPER CO. ARIZO

Mine office: Humboldt, Yavapai Co., Ariz. W. H. Knight, president general manager; W. F. Whitney, vice-president; J. E. Russell, secretary; F Moore, treasurer. Organized 1907, under laws of Arizona, with capitaliza $1,500,000. Lands, 5 claims, area 100 acres, about a mile south of the H boldt smelter, having a 25′ shaft and a 175′ tunnel, said to show 2 ledges, 15′ to 75′ width, carrying ore average about 4% copper, with high grade p streaks.

KNIGHT INVESTMENT CO. UT

Office: Knight Blk., Provo, Utah. Jesse Knight, president; Amanda Knight, vice-president; R. Eugene Allen, secretary and treasurer; preced officers, Raymond Knight, W. Lester Mangum, J. William Knight and I Knight, directors. This company controls a large number of properties, considerable promise, in the Tintic district of Juab county, Utah.

KNIGHT'S ISLAND-ALASKA COPPER CO. ALAS

Office: 902 Lowman St., Seattle, Wash. Mine office: Valdez, Prince liam Sound, Alaska. Jas. J. Godfrey, secretary; William Egan, superintend Lands, 17 claims, on Dryer Bay, Knight's Island, in the Prince William So district, having a 280′ tunnel showing a vein up to 25′ in width.

KNIGHT'S ISLAND CONSOLIDATED COPPER CO. ALAS

Office: 1115 Stock Exchange, Chicago, Ills. Mine office: Valdez, Ala H. Curtis Elliott, president; H. P. Elliott, first vice-president; Chas. G. H bard, second vice-president and general manager; A. J. Elliott, secretary E. Slocum, treasurer. Organized Sept. 12, 1906, under laws of Washing with capitalization $1,000,000, shares $1 par. Is controlled, through ow ship of $505,480 in stock, by Hubbard-Elliott Copper Mines Development Lands, 60 claims, area 1,200 acres, in 5 groups, having a 128′ tunnel sho chalcopyrite, associated with pyrite and pyrrhotite, giving assays of 6 to copper. Has electric power, wharf, ore-bunkers and a sawmill with capacity of 20,000′, board measure. Mine and wharf are connected by a 3 Riblet aerial tram, of 600 tons daily capacity.

***KNIGHT'S ISLAND* COPPER CO.** ALA

Mine office: Valdez, Alaska. J. C. Dieringer, secretary; Wm. Page,

st. Capitalization, presumably $1,500,000. Lands, on Dryer Bay, 's Island, near tidewater, show a promising gossan carrying copper Mine has 3 tunnels, showing ore estimated to average 21.32% copper, too high. Made a trial shipment, July, 1907, but a tram-line is neces- regular production.

'S ISLAND MINING & DEVELOPMENT CO. **ALASKA.**

e: 1267 Lexington Ave., New York, N. Y. Mine office: Valdez, W. C. Rothkranz, president and general manager; Jesse Miller, vice and secretary; Robert Kutschinski, superintendent. Lands, 28 claims, Bay, said to show several veins of 12′ average width, carrying 12% ite, which probably is an overestimate. Has a small power plant and

IAHON MINES. **IRELAND.**

d by Bonmahon Copper Mines Development Syndicate, Ltd.

'ON MINING CO. **MICHIGAN.**

Organized 1853, with capitalization $500,000. Levied circa $160,000 ents, to 1872. Merged, circa 1898, in Adventure Consolidated Copper erly at Greenland, Ontonagon Co., Mich.

NE. **JAPAN.**

office: Tsunekanemaru-mura, Ashina-gori, Bingo, Japan. Is an old reopened 1893. Ore is chalcopyrite, associated with sphalerite, pyrite eous hematite, all argentiferous, in a fissure vein 4′ to 8′ wide, with talc and hornblende. Country rock is hornblende-granite. Con- ore averages 13.4% copper and 4% silver. Production, 1900, was fine copper. No production of copper reported recently, and pre- lle.

-PIONEER MINING & MILLING CO. **COLORADO.**

Formerly at Dumont, Clear Creek Co., Colo.

MINE. **JAPAN.**

office: Kawabe-mura, Shonan-gori, Mimasaka, Japan. Mine, opened ies chalcopyrite, associated with pyrite and small quantities of ore occurring in lenses, largest 60′ in diameter, with clay gouge, in and clay-slate. Production, 1903, was 232,882 lbs. fine copper, a om 348,497 lbs. in 1899. No later official returns received, and prob-

MINE. **JAPAN.**

office: Hanawa, Kazuno, Rikuchu, Japan. Mine, which is very es partly in the province of Ugo, and once produced circa 1,000,000 pper year, with considerable gold as a by-product, but in 1903 made 33 lbs. fine copper, and presumably is idle.

AI COPPER MINING & SMELTING CO. **IDAHO.**

Formerly at Port Hill, Bonner Co., Idaho.

AI COUNTY MINING CO. **IDAHO.**

Detroit, Mich. Mine office: Priest River, Bonner Co., Idaho. tion $2,000,000, shares $1 par. Lands are at the eastern end of te. Idle.

AI MINING & MILLING CO., NO. 2. **IDAHO.**

office: Priest River, Bonner Co., Idaho. Lands, 7 claims, at the riest Lake, opened by tunnels of 30′ and 40′, showing ore gave ge assays in copper and silver.

AY COPPER-GOLD MINING CO.

15 Exchange Pl., Jersey City, N. J. Incorporated Nov. s of New Jersey, with capitalization $500,000, by Mes urner and Louis B. Dailey. Location of lands, if any, abortive.

KOOTENAY COPPER MINING CO., LTD. BRITISH COLUMB

Letter returned unclaimed from former office, Spokane, Wash. M office: Creston, West Kootenay, British Columbia. O. J. Wiggins, ag Organized circa 1906, with capitalization $50,000, shares 5 cents par.

KOPERMYN (TRANSVAAL), LTD. TRANSVA

Office: 237 Finsbury Pavement House, London, E. C., Eng. Mine off Pietersburg, Zoutpansberg, Transvaal. E. C. C. Smith, secretary. Organiz Oct. 19, 1905, under laws of Great Britain, with capitalization £120,000, 100,000 shares of £1 par and 2,000 shares of £10 par; issued, £110,383. Lan 860 acres, 19 miles southeast of Pietersburg. Estimated reserves are 45,0 long tons of ore averaging 6% copper and 2 dwts. gold, which seems exce sive, in view of the extremely limited development secured.

KOPPER KROWN MINING CO. WYOMIN

Letter returned unclaimed from former office, 56 Fifth Ave., Chicago, Il Mine office: Hecla, Laramie Co., Wyo. Henry Schwartz, Sr., president; Ed Hartwell, vice-president; J. May, treasurer; Alonzo Hastings, secretary; pr ceding officers and Henry Schwartz, Jr., directors. Organized under laws Wyoming, with capitalization $1,500,000, shares 50 cents par. Lands, 1 acres, having 413′ of workings, claimed to show 10,000 tons of sulphide blocked out for stoping. Company advertised that it planned building smelter, and was ready to ship on a moment's notice, but seems to have fail to receive the notice. Presumably idle.

KOSAKA MINE. JAPA

Owned by Fujita-Kumi & Co.

KOTSINA COPPER CO. ALASK

Office: 1007-160 Washington St., Chicago, Ills. Mine office: Vald Alaska. Chas. A. McKenzie, president. Organized 1906, under laws of A zona, with capitalization $2,000,000, shares $1 par. Lands, 110 claims, a 2,200 acres, in 6 groups, including the Craford & Ammon group, in the Kots River Valley, circa 85 miles northeast of Valdez.

KREMLIN MINING CO. UTA

Mine office: Bingham Canyon, Salt Lake Co., Utah. Has a 300′ sha and is drained through the main tunnel of the Bingham Consolidated. Is s to show a large body of concentrating ore, on the 300′ level. Idle.

KRUG GOLD & COPPER MINING CO. WASHINGTO

Mine office: Chewelah, Stevens Co., Wash. Lands, known as the Ha ford group, 7 miles northwest of Chewelah, have a 108′ tunnel, said to sh ore giving good assays in copper, silver and gold.

KRUGER COPPER & SILVER MINING CO. MEXIC

Dead. Formerly at Cusihuiriáchic, Iturbide, Chihuahua. Fully descrip Vol. VII.

KUNE MINE. JAPA

Owned by Furukawa Mining Co.

GEWERKSCHAFT KUPFERBERG. GERMAN

Dead. Formerly at Kupferberg, Bavaria, Germany.

KUPFERKIESBERGBAU KUPFERPLATTE. AUSTRI

Mine office: Kitzbühel, Tyrol, Austria. Ore is chalcopyrite, with qua gangue, occurring as horizontal beds in Silurian slates. Is an old mine a was a small producer at last accounts.

KURILLA MINE. AUSTRALI

Owned by Wallaroo & Moonta Mining & Smelting Co., Ltd.

KUROTAKI MINE. JAPA

Mine office: Motokawa-mura, Tosa-gori, Tosa, Japan. Is a short dista *only from* the famous Besshi mine. Ore is chalcopyrite, first quality aver *ing 10%* and second grade 2 to 4% copper. Beds are much contorted, princi

nd values being found in the saddles and troughs, which average about
ness. Production, 1900, was 151,890 lbs. fine copper. Presumably idle.

CHATTERTON COPPER MINING CO. **WYOMING.**

l. Succeeded by Chatterton Mining Co. Formerly at Encampment,
o., Wyo.

RA MINE. **JAPAN.**

ed by Furukawa Mining Co.

NDAL MINING CO. **NEW MEXICO.**

office: Carlsbad, Eddy Co., N. M. Dr. J. Odd, manager. Lands are
from Carlsbad. Presumably idle.

NGENS KOBBERGRUBER. **NORWAY.**

d by Altens Kobbergruber.

AFONTEIN SYNDICATE, LTD. **TRANSVAAL.**

office: Waterberg, Transvaal. Organized 1907, under laws of Trans-
capitalization £12,000, shares £1 par. Property is an option on the
aggafontein No. 996.

COPPER MINING CO. **AUSTRALIA.**

: Sydney, Australia. Mine office: Adaminaby, N. S. W., Australia.
croft, chairman; preceding officer, Dr. Taylor Young, A. G. de Lauret
Toohey, directors. Mine, opened by a 175′ shaft, shows ore in a main
to range 14 to 20% copper, with a footwall vein of 4′ to 6′ width
copper assays. Reduction works include a concentrator with Crook
and jigs, and a smelter having a small reverberatory furnace, pro-
% matte.

MINING & SMELTING CO. **MEXICO.**

: 709 Lankershim Bldg., Los Angeles, Cal. Letter returned un
om former mine office, La Bufa Sahuaripa, Sonora, Mex. Organized
capitalization $6,000,000, apparently as a holding company for La
ng, Milling & Smelting Co. and La Dura Mill & Mining Co.

RS' COÖPERATIVE GOLD, SILVER **BRITISH COLUMBIA.**
PPER MINING CO.

: 99 Washington St., Chicago, Ills. Mine office: Golden, Kootenay
, C. Gust. L. Yount, president; N. N. Strandberg, vice-president;
Sweiberg, secretary; John W. Turnquist, treasurer; "Rev." C. J.
eral agent and liar-in-chief. Organized under laws of British Co
ith capitalization $150,000, shares 10 cents par; capitalization
ncreased to $500,000, shares 10 cents par. Lands include the Shin
oup, having tunnels of circa 200′ and 400′. Built a smelter, wh
success, having no mine to feed it. Present officers apparently
hence it is uncertain whether they are victims or victimizers.
lin, a renegade Baptist preacher, who is a disgrace to the cl
oss grafter.

NEAS COPPER CO.

returned unclaimed from former office, 10 Wall St.,
e office: La Cananea, Arizpe, Sonora, Mex. Fred A.
d N. Darling, secretary. Organized, circa 1901, under
capitalization $5,000,000, shares $5 par. Was promote
Co., but management said later to be in hands of
bankers of Nogales, Arizona, and Nogales, Sonora,
including La Libertad and El Ultimatum group
d, having a 150′ shaft, with circa 200′ of work
f ore similar to the Puertecitos ores of the
onsidered promising, but long idle and

MINA LA CARIDAD. M

Mine office: Pilares de Teras, Moctezuma, Sonora, Mex. Lands, developed, show ore assaying 8 to 55% copper.

LAC LA BELLE MINING CO. MIC

Dead. Sold lands, 1905, for $250,000, to Manitou Mining Co. For Delaware Mine, Keweenaw Co., Mich.

LA CLEDE GOLD & COPPER MINING CO. COL

Dead. Formerly at Dumont, Clear Creek Co., Colo. Fully described

LA COBRIZA MINING CO. M

Mine office: Noria, Altar, Sonora, Mex. Employs 50 men. Emery, president and general manager; W. T. Stewart, vice-presiden Sharpe, secretary and treasurer; preceding officers and Geo. Miller, d C. W. Tonkin, superintendent. Organized June 5, 1905, under laws of with capitalization $250,000, shares $1 par, and is protocolized in Me

Lands, 51 pertenencias, reported as of 230 acres area, with misc holdings in the Altar and Magdalena districts, showing contact dep tween limestone, quartzite and granite, of nearly vertical dip, one under development, reported as 80′ wide and traceable 1,500′, carry bonates to depth of about 100′, succeeded by chalcopyrite estimated age 6 to 8% copper, 4 to 6 oz. silver and $1.50 to $3 gold per ton. opened by shafts of 150′ to 500′, with circa 2,500′ of workings. Has a steam plant, with an 8x10″ hoist and 6-drill Sullivan air-compressor. eral small mine buildings, store, office and about 15 dwellings.

One carload of ore, shipped to El Paso smelter, returned 13% cop silver and $1.50 gold per ton. Company plans installing a 100-ton M sulphide smelting furnace.

LA CORONA COPPER MINING CO., LTD.

Office: Clock House, Arundel St., Strand, London, W. C., En office: Fuencaliente, Cuidad Real, Spain. Edw. E. Fernandez, c Harold Cossins, secretary; John W. Richmond Lee, consulting engine E. Marshall Hall, engineer; G. T. Vivian, mine manager. Organized 1905, under laws of Great Britain, with capitalization £20,000, share in 4,000 ordinary and 16,000 deferred shares; issued, £16,500. L hectares, including 3 mines, known as Corona I, Corona II and Lo Presumably idle.

LADD METALS CO.

Office: Canterbury Bldg., Portland, Ore. Mine offices: Minera ington Co., Idaho, and Landore, Washington Co., Idaho. Chas. E. La dent; Samuel Peacock, vice-president and general manager; John Sno tary and treasurer; Geo. D. Rich, general superintendent.

Lands, 2 groups, both in the Seven Devils district. First group, at Mineral, bought of Consolidated Copper Co., has shipped some ore ing 5% copper and up to 350 oz. silver per ton. The property at La shipped a little ore averaging 35% copper, and ore of much lower g been smelted on the ground.

Company has smelters at both Mineral and Landore. The Minera has a small water-jacket blast-furnace, burning coke. The smelter at of 60 tons daily capacity, has a 50-ton combination reverberatory an jacket blast-furnace, former burning wood and latter burning co anomalous furnace was devised on a novel and absolutely unsuccess combining in a double stack blast and reverberatory furnaces, with ward blast and a moist updraft, charging being in both furnaces, and the two. Fuel was to have been furnished by a gas-producer consu *rotten white fir wood.* The theory and practice did not correlate, h *plant* was remodeled along more common lines.

re closed down November, 1905, on account of poor trans-ies, rendering it difficult to secure flux and fuel. Property, ated as to facilities for transport, is considered promising.

A MINING CO. **MEXICO.**
East 4th St., Cincinnati, Ohio. Mine office: La Cananea, Mex. Organized 1905, under laws of Arizona, with capitaliza-res $10 par. Apparently is related to the Democrata Cananea o.

NING & SMELTING CO., S. A. **MEXICO.**
an incorporation of the Mitchell Mining Co.

L & MINING CO. **MEXICO.**
Lankershim Bldg., Los Angeles, Cal. Mine office: La Bufa, a, Mex. Is under the same management as the Bufa Mining, ng Co., with lands adjoining, on the Yaqui River, and is said able development.

ING CO. **MEXICO.**
care of Hartmann & Groff, managers, Torres, Hermosillo, res carry gold, silver, copper and lead. Has steam power and t as silver-lead-copper concentrates, when working. Idle.

COPPER CO. **WASHINGTON.**
erly at Chelan, Chelan Co., Wash.

OPPER MINING CO. **MAINE.**
ated briefly, circa 1880. Formerly at Blue Hill, Hancock Co.,

COPPER MINING CO. **ARIZONA.**
erly at Pima, Graham Co., Ariz. Described Vol. II.

OPPER CO. **NEWFOUNDLAND.**
s sold to Carmen Copper Mines, Ltd. Formerly at Lady Pond,

OPPER MINING CO. **MONTANA.**
La Salle St., Chicago, Ills. Mine office: Elliston, Pon hur J. Bamford, president; V. W. Hemala, secretary; G. er. Organized 1905, under laws of South Dakota, with 000. Lands, 4 claims, 12 miles from Elliston, well tim evelopment is by two 110′ shafts, said to show ore Company alleged, in its prospectus, that dividends , which is ample evidence that the company was rott e and presumably moribund.

COPPER MINES, LTD.
Budge Row, London, E. C., Eng. Mine office: G. B. Elkington, J. P., chairman; F. A. Bag 18, 1906, under laws of Great Britain, wit £1 par; issued, £150,000. Lands, 3 groups rezana, El Elsueño and others. Equipment n of a concentrator and 25-stamp mill i red promising, but development has be lities and by high freight rates on the

INING CO.
d up 1906. Formerly at Matchwood

NING & SMELTING CO.
ine: Danville, Ferry Co., Wash.
ger; A. E. Fennel, vice-president
receding officers, H. M. Ge

Bennett, directors. Organized March 18, 1908, under laws of Washing with capitalization $1,500,000, shares $1 par. Annual meeting, first Mon in June.

Lands, 8 claims, area 150 acres, in 2 groups, in the Curlew district, the northeastern slope of La Fleur Mountain, in the northern part of Fe county, showing diorite, andesite and quartzite, carrying a fissure vein in d base and a contact deposit between diabase and andesite, of which one body, on the Cuba group, of 8′ estimated average width, traceable 800′, sh chalcopyrite estimated to average 1% copper, 2 oz. silver and $3.50 gold p ton, and has given assays of 2.5 to 5% copper, 2 to 3 oz. silver and $1 to gold per ton. Development is by a 90′ shaft and a 600′ tunnel. Property served by two railroads within a mile. Company plans lengthening t tunnel.

LA FLORENCIA GOLD & COPPER CO. MEXIC

Office: 30 South Ninth St., Richmond, Va. Mine office: Cos, Moctezum Sonora, Mex. D. A. Ainslie, president; R. F. Hudson, secretary; Tom L. West, g eral manager. Organized 1902, under laws of West Virginia, with capitali tion $1,000,000, shares $1 par. Lands, 134 pertenencias, area circa 330 acr 25 miles from nearest railroad, showing a wide mineralized belt with he iron capping, traceable 2 miles. Main shaft, 250′, with a 50′ crosscut in assaying 5 to 9% copper, with fair gold and silver values. Property co ered promising, but idle several years and company apparently moribund.

LA FLORIDA MINING, MILLING & DEVELOPING CO. MEXIC

Dead. A twin of La Florencia Gold & Copper Co., Formerly at Cos, M tezuma, Sonora, Mex.

LA FORTUNA MINING CO. MEXIC

Office: 416-27 William St., New York, N. Y. Mine office: Ahualu Jalisco, Mex. W. B. Stewart, president; Frank E. Lloyd, manager. La 40 pertenencias, 5 miles northwest of Ahualuleo, showing a 5′ to 20′ v carrying auriferous and argentiferous copper and lead ores, with quartz gang Mine is opened by tunnels, with about one-half mile of workings, showi circa 10,000 tons of ore. Has a small mill. Presumably idle.

LA FORTUNA MINING CO., S. A. MEXIC

Is the Mexican incorporation of the Fortuna Mining Co.

LA FRANCE COPPER CO. MONTAN

Office: 42 Broadway, New York, N. Y. Mine office: Butte, Silver B Co., Mont. Works office: Basin, Jefferson Co., Mont. Robt. S. Walker, pr dent; preceding officer, F. Augustus Heinze, Frederick Eckstein, Russell H kins and Stanley Gifford, directors; Wm. A. Kidney, general manager. ganized April, 1905, under laws of New York, with capitalization $7,000,0 shares $25 par, in $1,000,000 preferred 6% stock and $6,000,000 common sha Authorized, Nov. 2, 1906, an issue of $2,000,000 first-mortgage 25-year convertible bonds, to be issued in exchange for a like amount of debentu outstanding. Defaulted interest on coupon bonds due January and July, 19 Is controlled, through stock ownership and otherwise, by United Copper or some of its subsidiary corporations, and $2,000,000 worth of common sto is said to be owned by Copper Securities Co. Reported net earnings of $ $491,000, for year ending June 1, 1907, with a small loss on operations for y ending June 1, 1908.

Lands, 8 fractional claims, area 32 acres, known as the Lexington mi held from the French owners under a $250,000 bond and lease, running in name of Louis Girard, assigned to La France Copper Co. Dispute over la with Butte & Boston was settled during 1907. Mine is at Walkerville, in *northern part* of the Butte camp.

The Lexington mine has a 3-compartment, 1,450′ main shaft, connec

' level with the Alice mine, and has several miles of workings. The worked many years ago, for gold and silver, but below the 1,400' a 30' vein, with granitic gangue, carrying stringers of sulphide ore to 4% copper, and is claimed also to have a vein of 14' average ying chalcopyrite associated with considerable sphalerite and a little ring average returns of 2.75% copper, 6 to 7 oz. silver and $5 gold hich figures are considered exaggerated. It is also claimed that the isappeared on the 800' level, but neither statement is credited. The unwatered, 1907, to depth of about 1,000'.

nent includes a 15x30" Ottumwa hoist raising a single-deck cage, nine pumps and a 50-drill air-compressor.

ine has an old mill, idle since circa 1903, with about 100,000 tons us zinc tailings, which perhaps could be cyanided at a profit.

-ton mill was built, 1907, near the mine, between Walkerville and . This mill uses the magnetic separation process of Sutton, Steele and to May 1, 1908, was claimed, by the company, to have cost In actual operation the mill, which uses no water, apparently treated tons of ore daily, and made such an insufferable quantity of dust s closed down by the courts, an injunction having been sued out by Walkerville. No great efforts were made by the company to pre- suance of this injunction, and it is probable that it came at a con- ie, as it is doubtful if the plant was profitable.

duction plant, at Basin, is the old Basin & Bay State concentrator, held under a $600,000 bond and lease. The plant is rated at 1,500 al daily capacity, equipment including 2 crushers, 8 sets of rolls, 4 mills, 90 Hartz jigs, 60 Wilfley tables and 80 Callow slime settling

tion, for year ending June 1, 1907, was 34,336 tons of ore, giving ld of $14.18 per ton, and costing $6.35 per ton to mine. Maximum in 1907 was circa 150 tons daily. The company is understood to be oll the reduction plant. Company collected poll taxes from its em- the city of Butte, but at last accounts had not turned the taxes city authorities. Property was sold for taxes, amounting to about a August, 1908, but is redeemable within one year, under a lump $500, plus 1% monthly on the amount delinquent.

LA MINING CO. **MEXICO.**

Formerly at La Bufa, Sahuaripa, Sonora, Mex.

TY MINING & SMELTING CO. **COLORADO.**

nd works office: Lake City, Hinsdale Co., Colo. Mine is developed . Plant is a 50-ton smelter.

PPER CO. **MICHIGAN.**

Houghton, Mich. Mine office: Belt, Ontonagon Co., Mich. Reg- Pryor, president; Wm. D. Calverley, secretary; preceding officers, ice, Richard M. Edwards, Benj. F. Chynoweth, Linus Stannard and ees, directors; Wm. Wearne, superintendent.

ized Nov. 28, 1905, under laws of Michigan, with capitalization shares $25 par; issued, $2,000,000. Shares are listed on the Boston ange. Federal Trust Co., Boston, registrar; State Street Trust Co., nsfer agent.

ny began business with $45,000 cash, of which corporation fees, ses and other expenditures preliminary to actual work took $7,000, 8,000, of which $14,000 was spent for drilling and $5,000 for pre- rface work. For $14,000 that was expended on actual mining, to 908, the company sunk a 300' shaft on the Knowlton bed, did 600' , *with 3 months' stoping at various points*, to determine the average

the case of the Lake, the flexure is more marked than at any other noted in the district.

orth drift of the Lake is cut off, at a short distance from the shaft, ndary line of St. Mary's Mineral Land Co., which owns a tract carry- 15 acres of the underlay of the Lake bed, jutting into the southeast- of the Lake tract, but the Lake has the entire underlay, and a con- f the outcrop for about one-fourth mile northeast of the boundary al lands, in addition to an extensive tract to the westward, which ched from the present shaft, or by additional shafts sunk to the

nent includes a 12x15" duplex hoist, good for 500' depth, which will l by a hoist good for one-half mile depth, bought of the Champion air-compressors of 6-drill and 15-drill capacities, taken from the of the old Belt mine. Buildings include a number of old structures location, and at the new shaft there is a 3-acre clearing having a fthouse and combined engine and boiler house, with machinery in- concrete foundations.

roperty is served by the main line of the Copper Range railway, es through the old Belt location, and the new shaft is reached by spur.

pper showing of the Lake has excited more interest in the district nining development since the discovery of the great Baltic lode, in h led to the opening of the Baltic, Trimountain, Champion and Su- s, with other properties developing on the same bed. The showing e is materially the best ever made on any amygdaloidal bed in On- unty, for a similar amount of work, and in view of the great width , and its remarkable mineralization, so far as opened, it is reason- to predict the making, in time, of one of the great amygdaloidal the district. The management is excellent, both technically and

PPER MINING CO., LTD. **NOVA SCOTIA.**

Eastern Harbour, N. S. Mine office: Polson's Brook, Antigonishe H. G. Dunbar, secretary and treasurer; A. G. Baillie, general agent. circa January, 1908, with capitalization $2,500,000, shares $1 par. a 6,400 acres, on Polson Lake, showing auriferous and argentif- r ore, opened by a 103' shaft, with about 550' of workings.

PPER PROPRIETARY CO., LTD. **SWEDEN.**

40 Queen Victoria St., London, E. C., Eng. Col. A. H. C. Lynch, M. Schreiter, mine manager; C. Maurice Champness, secretary. Or- arch 10, 1906, under laws of Great Britain, with capitalization 298,000 ordinary shares of £1 par, and 40,000 deferred shares of olds lands through Lake Copper Syndicate Aktiebolag, organized of Sweden. Lands, on Lakes Animmen and Arr, circa 90 miles othenberg, Sweden, include the Stora Strand and Vingnäs mines, w outcrops traceable circa 10 miles. These mines have 13 shafts, low, deepest circa 800', showing ores giving assays of slightly better opper, with small gold and silver values. Ore reserves of Stora e estimated, Jan. 1, 1908, at 100,000 tons. Is said to plan erecting

ORGE MINE. **AUSTRALIA.**

ffice: Bungendore, Murray Co., N. S. W., Australia. W. J. Chan- Plun, owners. Lands, 172 acres, freehold, at Captain's Flat, Lake e mine, circa 600' deep, was opened 1882, on a main vein of 22' to having a *meridional strike and vertical* dip, in Silurian slates, ore *replacements along fault-lines, as a* compact, fine-grained mixture

of chalcopyrite, sphalerite, galena and pyrite, with aluminous quartzose gangue carrying an average of only about 1.5% copper, with small gold and silver values. Ore, from its nature, is very refractory in smelting, and average returns, 1898, were only 1.45% copper.

The smelter has four 60-ton water-jacket blast-furnaces, and the ore requires heavy fluxing and fuel charges. Pyritic smelting was tried, but proved unsuccessful.

Maximum production of the mine was circa 500 tons fine copper yearly sold as matte carrying 30 to 35% copper, 65 oz. silver and 1 oz. 12 dwts. gold per ton. Several successive companies have been wrecked in attempting to operate the mine. Production, 1907, was only 40 tons of ore, which remained untreated.

LAKE GEORGE MINES, LTD. AUSTRALIA

Dead. Reorganized, 1904, as Lake George Successors, Ltd. Formerly at Bungendore, Murray Co., N. S. W., Australia.

LAKE GEORGE SUCCESSORS, LTD. AUSTRALIA

Dead. Formerly at Bungendore, Murray Co., N. S. W., Australia. Fully described Vol. VI.

LAKE HURON COPPER SYNDICATE, LTD. ONTARIO

Dead. Voluntarily wound up, February, 1901.

LAKE JUKES COPPER CO., N. L. TASMANIA

Offices: 103 Gresham House, London, E. C., Eng., and Prells Bldgs., Melbourne, Australia. Mine office: Crotty, Tasmania. J. P. Madden, chairman; H. S. Muir, mine manager; N. Madden, Melbourne secretary; W. W. Futcher, London secretary. Organized Oct. 8, 1900, under laws of Victoria, with capitalization £150,000, shares £1 par. Lands, 2 leases, area 120 acres, on Mount Jukes, on the west coast of Tasmania. Has a 5-stamp mill.

LAKE MILLING, SMELTING & REFINING CO. MICHIGAN

Office: 60 State St., Boston, Mass. Works office: Point Mills, Houghton Co., Mich. H. F. Fay, president. Organized under laws of Michigan, with capitalization $400,000. Receipts, 1907, were $100,000 raised by assessment and $126,383 received from stamping 414,760 tons of rock. Stamping cost, 1907, were 20.839 cents per ton. Balance on hand, Jan. 1, 1908, was $61,619.

The millsite, 406 acres, carrying more than 1¼ miles frontage on Portage Lake, adjoins the Franklin millsite. The mill was built by the Arcadian, and was bought, circa 1904, by the Centennial, and was transferred to the present corporation, stock of which is owned jointly by the Centennial and Allouez.

The mill is 132x104', of steel frame, having 3 Nordberg stamps, with foundations built for 3 additional heads. Foundations under the old heads were in bad shape, hence a new 12' concrete foundation was built under one head which was compounded, giving it a daily capacity of about 700 tons, and a second simple head has been overhauled. The mill has crushing rolls, to treat oversize material.

The mill has a 15,000,000-gallon Nordberg pump, and a wharf running 67' into deep water, fitted with a modern coal-hoist and coal-shed. Miscellaneous buildings include a machine-shop, smithy, cooper-shop and a number of dwellings for employes.

LAKE SHORE MINING CO. MICHIGAN

Office: 990 West Kensington Road, Los Angeles, Cal. Mine office: Greenland, Ontonagon Co., Mich. W. H. Garlick, president. Organized under laws of Michigan, with capitalization $500,000, shares $25 par. Lands, 773 acres, [illegible] ented, on the shore of Lake Superior, in Town 51 North, Range 44 West, re*ported to* carry bedded deposits, between slate walls, of 5' and 12' width, show*ing copper* oxides and chalcocite giving average assays of 1.5% copper, 95 oz.

silver and 40 to 80 cents gold per ton. Has been but slightly prospected, and is idle.

LAKESIDE COPPER CO. **UTAH.**

Office: care of Howard S. Stowe, vice-president, Salt Lake City, Utah. Mine office: Promontory, Box Elder Co., Utah. H. E. Baker, president. Lands, 27 claims, near the Lucin cut-off, showing what apparently is a blanket vein of 15' to 50' width, traceable circa 300', proven by shallow trenches showing ore assaying up to 40% copper.

LAKESIDE GOLD-COPPER MINING CO. **WASHINGTON.**

Dead. Formerly at Index, Snohomish Co., Wash. Described Vol. VII.

LAKE SUPERIOR & ARIZONA MINING CO. **ARIZONA.**

Dead. Title changed, 1904, to Lake Superior & Arizona Mining & Smelting Co. Formerly at Florence, Pinal Co., Ariz.

LAKE SUPERIOR & ARIZONA MINING & SMELTING CO. **ARIZONA.**

Office: Calumet, Mich. Mine office: Superior, Pinal Co., Ariz. Employs circa 60 men. John D. Cuddihy, president; Dr. W. A. Holt, vice-president; A. Petermann, secretary; Wm. B. Anderson, treasurer; preceding officers, J. T. Wheeler, Wm. Thielman, Angus W. Kerr, Edward Ulseth, Henry L. Baer and Capt. Thos. Maslin, directors; Fred W. Hoar, superintendent; Geo. N. Bell, mine superintendent; Dugald Stewart, clerk.

Organized Sept. 30, 1902, under laws of Arizona, as the Lake Superior & Arizona Mining Co., with capitalization $200,000, shares $1 par, and reorganized, 1904, under present title, with capitalization $2,500,000, shares $20 par; $19 paid in, to end of 1908. Levied $1 assessments, payable in installments, in 1906, 1907 and 1908. Under old territorial laws of Arizona the corporation was unable to sell stock delinquent on the 1907 assessment, but a change in the laws made is possible to do this, to the great relief of the company, which was greatly hampered by neglect of many of the shareholders to pay the 1907 assessment, until compulsion was employed.

Lands, 11 claims, area 110 acres, freehold, in the Pioneer district, 3 miles south of the Silver King mine, 30 miles west of Globe and 28 miles east of Florence. Litigation over 2 claims, instituted by F. Pheby, was decided in the company's favor, in all courts. The property, formerly known as the Gold Eagle mine, was worked for gold, by the Gem Gold Mining Co., which went out of business, 1895, after paying considerable dividends. The old workings include many shallow shafts and short tunnels, opened at random, from which the former owners extracted rich surface ores.

The property shows limestone, quartzite and diabase, with 3 ore bodies, of which 2, under development, occur as contact deposits between quartzite and limestone, and in limestone, these having a quartzite footwall and limestone hanging, with average width of circa 6' The main ore body, of 6' to 7' width, has a north and south strike, with dip of 26° 30', and shows a prominent outcrop. Ores are silicious oxides and carbonates, associated with iron and manganese, and should be valuable for fluxing the base ores likely to be opened at greater depth. Shipments of 13 carloads, 1905, from the Anderson tunnel, gave average returns of 31.6% copper, 2.2 oz. silver and $2.67 gold per ton, netting $24,649.81.

Development is by 2 shafts and 4 tunnels. The ground is not especially heavy, and little timber is required, except for openings in occasional soft places. The mine has circa 7,000' of workings, not including the old openings made by former owners.

The 375' Vivian shaft is sunk vertically, in low ground, to depth of 279', and cut diagonally through about 30' of ore.

The Holt tunnel, of circa 500' length, *cuts a 16' ore body, at approximately right angles, with a back of 216'.*

The Holt shaft is a 2-compartment blind shaft, starting from the brea of the Holt tunnel, at 216′ depth from surface, and was sunk, 1908, to depth o 850′ from surface, and is planned to be sunk to 1,000′. This shaft has a hois good for 1,000′, and is said to show, on the 850′ level crosscut, ore assayin up to 50% copper and $28 gold per ton, with a quartz footwall carrying up to $28 gold per ton, but the gold figures are considered excessive.

The Carlton tunnel, circa 100′ below the Holt tunnel, is connected wit the latter by a 165′ winze on the dip of the ore body, and is driven, in th ore, for circa 3,000′ length, showing ore assaying up to 30% copper.

Equipment includes a steam plant with a 175-h. p. water-tube boiler, an a 16-drill Rand 2-stage air-compressor. Petroleum is used for fuel, and there are 5 storage tanks at the mine and 2 at Florence, each holding 2 carloads of oil.

Buildings include a power house, smithy and bunk-house at the mine, an an office and dwelling at Florence, 28 miles distant.

The Arizona Midland R. R. Co. has been organized, by shareholders of th Lake Superior & Arizona Mining & Smelting Co., with capitalization $500,00 shares $1 par, for the purpose of building a railroad from the mine to Florence to connect with the Gila Valley, Globe & Northern railway. This line would traverse 19 miles of easy rolling country, and 9 miles of hills, and would cost from $300,000 to $500,000 for construction and equipment.

Operations were suspended circa November, 1907, and resumed July, 190 with a force of about 60 men. Production, 1907, was 92,120 lbs. fine copper 1,040 oz. silver and 188 oz. gold. The property is considered promising, and th management has shown persistence in its work, but the mine cannot be place on a profitable productive basis until rail connections are secured.

LAKE SUPERIOR & BISBEE DEVELOPMENT CO. ARIZONA

Dead. Formerly at Bisbee, Cochise Co., Ariz.

LAKE SUPERIOR CONCENTRATING CO. MICHIGAN

Dead. Liquidated 1905, and practically succeeded by Copper Concentrating Co. Formerly at Hancock, Houghton Co., Mich.

LAKE SUPERIOR COPPER CO. MICHIGAN

Mine office: Rockland, Ontonagon Co., Mich. Organized July, 1853, under laws of Michigan, with capitalization $500,000, shares $25 par. Was set up by Minesota Mining Co. Lands, 640 acres, in Sections 13 and 14, Town 50 N., Range 39 W., carrying the northeasterly extension of the parallel cupriferous beds of the Evergreen Belt, opened in the Mass and Adventure mines. Expended about $40,000 in assessments and made 14,821 lbs. fine copper. Idle since 1874.

LAKE SUPERIOR COPPER CO. ONTARIO

Office: care of Lewis Brittan, president, 45 Milk St., Boston, Mass. Mine office: Port Arthur, Thunder Bay, Ont. Gustave E. Wolters, vice-president; Jas. A. Tirrell, secretary and treasurer; Capt. Walpole Roland, consulting engineer. Organized January, 1907, under laws of Maine, with capitalization $3,000,000, shares $25 par, and is registered under laws of Ontario. Lands 480 acres, known as the Cloud Lake mines, in the township of Crooks, 3 miles from mouth of Cloud River, opposite Isle Royale, and 25 miles south of Port Arthur. Property shows amygdaloidal and conglomerate strata carrying native copper, principal bed being an amygdaloid of about 20′ average width.

LAKE SUPERIOR COPPER & ZINC CO. ONTARIO

Dead. Charter forfeited, 1902. Formerly at Wolf River, Thunder Bay district, Ontario.

LAKE SUPERIOR COSO DEVELOPMENT CO. CALIFORNIA

Office: care of John Kiiskila, president, Hancock, Mich. Mine office: *Darwin, Inyo Co.,* Cal. Nels Majhannu, vice-president; Jacob Jarvis, secre

MINA LA LAPILLA.

Mine office: Alosno, Huelva, Spain. Wm. Guthrie Bowie, mana group of government concessions, adjoining the Tharsis mine, showi wide lense of cupriferous pyrite assaying 2.5 to 8% copper and 47 to phur. Was operated formerly by pillar-and-stall, leaving large qua ore in floors and pillars. Has about 1,200,000 tons of ore availab ground, and much more if worked open-cast. Has poor ventilation. shows enormous quantities of scoria, left from smelting operatio Romans. Is well equipped with machinery. Presumably idle.

LA MANGIARDE, LTD.

Office: 5 Clements Inn, Strand, London, W. C., Eng. Letter unclaimed from former mine office, La Tour-sur-Tinée, Alpes Maritime T. Cowperthwaite, chairman. Organized Oct. 30, 1903, with capi £4,000, shares £1 par; issued, £3,000. Lands, sundry coal mines and oped mineral lands carrying indications of copper, in the neighborhood Idle and apparently moribund.

SUCESIÓN C. J. LAMBERT.

Office, mine and works: La Compañia, La Serena, Coquimbo, Chi erty includes El Brillador and San Antonio mines, area 93 hectares, 1903, with a force of 38 men, produced 4,500 metric tons of 8% ore. rock is porphyry, carrying veins of about 90′ extreme width, with di sulphides appearing at depth of circa 100 meters. The Fortuna and mines employ circa 150 men. Los Bronces mine, formerly owned, has to Sociedad Minera de Los Bronces.

Reduction plant, 16 miles from Coquimbo, with rail connection, a 100-ton concentrator and a smelter that was the first modern plant using the Welsh system. Smelter has four 21′ reverberatory furnac calciners. Machinery equipment includes two 100-h. p. boilers, two engines and a small hydraulic turbine, fuel being Australian coke, c pesos per ton, laid down. Production formerly was copper sulphate, mainly by smelting plants using the Kröhnke process, but latterly this has been lost, and smelter now produces Chile bars of about 95% copp with slags averaging 0.7% copper, employing an average force of 10 wages of 1.3 pesos daily. Production, 1903, was 8,600 tons of ore, average copper tenor, with fuel consumption of about 6,000 metri coke, making 1,481,491 lbs. fine copper.

CHAS. LAMBERT & CO.

Works office: Swansea, Glamorganshire, Wales. Property is copper reduction works, including smelters and an electrolytic plant

LA MINA COBRE CO.

Office and mine: Tucson, Pima Co., Ariz. M. T. Brown, preside Kane, secretary and treasurer. Capitalization $2,000,000, shares $1 par 12 claims, circa 35 miles southwest of Tucson and 8 miles from Sasc about 300′ of workings. Has a gasoline hoist.

ERZBERGWERK LAMPERTUS.

Mine office: Hohenstein-Ernsthal, Saxony, Germany. Friederich Feltzner, president. Property carries auriferous and argentiferous ores of copper. Presumably idle.

LA NATIVIDAD MINING CO.

Dead. Was a swindle. Formerly at Coapa, Morelia Michoac Described Vol. V.

***LANCASTER* GOLD & COPPER MINING CO.**

Mine office: Prescott, Yavapai Co., Ariz. Apparently is suc

old & Copper Mining Co., of doubtful reputation, which formerly property.

12 claims, area circa 200 acres, 5 miles from Skull Valley station, gossan opened by several shafts of 50′ to 100′ depth, carrying some- erous oxidized and sulphide ores. The Anna Bell claim was asserted owners to show a vein 150′ wide, which is something more than iving average assays of 14.5% copper and $4.74 gold per ton from es, which figures are their own refutation. Equipment includes a nill and the beginning of a 100-ton concentrator. Idle, except for essment work.

T FREEHOLD TIN & COPPER MINES, LTD. **AUSTRALIA.**

1 Bucklersbury, London, E. C., Eng. Mine office: Herberton, Cardwell sland, Australia. F. E. Clotten, chairman and managing director; G. A. ine manager; F. J. Duck, secretary. Organized May 27, 1903, under reat Britain, as a reconstruction of the Lancelot Tin Mining Co., capitalization £120,000, shares £1 par; issued, £97,641. Debentures, thorized, £19,250 issued, at 10%. Lands, 60 acres freehold and 160 ehold, carrying ores of copper, tin, bismuth and wolfram, opened by in shaft and a 150′ tunnel. Has a concentrating mill, and is a small of tin and bismuth only, copper property being idle.

CK BAY MINING CO. **ALASKA.**

office: Landlock, Alaska. W. A. Dolan, manager. Lands, on a insula, with tidewater on both sides, have 2 tunnels on the western ing copper ore of good tenor.

OMA MINING CO. **MEXICO.**

r returned unclaimed from former office, Springfield, Ills. Mine yutla, Autlán, Jalisco, Mex. J. Breckenridge, superintendent. Prop- vs auriferous and argentiferous copper ores, and is said to have a ncentrator.

IA MINERA LA PAZ. **MEXICO.**

office: Cuatro Ciénegas, Monclova, Coahuila, Mex. Mine, known as has argentiferous copper ores. Employed circa 40 men, at last ac-

TA CONSOLIDATED MINING CO. **UTAH.**

. Was a bad egg. Formerly at Ogden, Weber Co., Utah.

U-DUNCAN MINES, LTD. **BRITISH COLUMBIA.**

. Formerly at Duncans, Vancouver Island, B. C. Described Vol. VII.

OMPENSA MINING CO. **MEXICO.**

office: Santa Maria del Oro, El Oro, Durango, Mex. P. J. Opper- rintendent. Has auriferous and argentiferous copper and zinc ores, m and water power, and a 10-stamp mill.

MINING CO. **MEXICO.**

r returned unclaimed from former mine office, Concepcion del Oro, Zacatecas, Mex. W. H. Banks, general manager. Organized 1907, talization $600,000. Property is the General Escobedo mine. Idle.

DEVELOPMENT CO. **ARIZONA.**

: Tombstone, Ariz. Letter returned unclaimed from former mine rbank, Cochise Co., Ariz. James Herron, president; preceding officer, re and D. L. Cunningham, directors. Lands, 20 claims, near Mescal irca 16 miles west of Fairbank, having 6 pits and trenches, showing mides and copper carbonates, giving average assays of 12% copper z. silver per ton. Idle.

A-NEGRITA MINING CO. **MEXICO.**

. Lands sold, circa 1903, to *American-Mexico* Mining & Development *nerly at San Lorenzo, Durango, Mex.*

JOSÉ LARRAGUIBEL. CHIL

Mine office: Algarrobito, La Serena, Coquimbo, Chile. Property is t Pajalones mine, having a vein of one meter average width, opened to depth 130 meters, with horizontal workings for 400 meters length. Production, 19 was 400 metric tons of ore averaging 14% copper tenor, equal to 123,457 fine copper.

LAS ADARGAS MINING CO. MEXIC

Office: 15 John St., New York, N. Y. Mine office: Jiménez, Chihuah Mex. E. G. Seiler, president; Geo. E. Crawford, secretary; W. A. Seam general manager, El Paso, Texas. Claims to be organized under laws of N York, with capitalization $1,000,000, shares $10 par. Declared a dividend 25 cents per share, April, 1902. Property said to be held under a bond $300,000, on which $15,000 was paid. Claimed to have a 300′ shaft. Regarde with much suspicion, and apparently moribund.

LA SAL COPPER MINING CO. COLORAD

Dead. Succeeded, 1904, by Consolidated La Sal Mining & Smelting C Formerly at La Sal, Grand Co., Colo.

LA SAL COPPER-SILVER MINING CO. COLORAD

Office: 1317-25 Broad St., New York, N. Y. Mine office: Cashin, Mon rose Co., Colo. J. Ensign Fuller, president; Arthur C. Danielson, vice-pre dent; Frank R. Allen, treasurer; John B. Overton, secretary. Apparently a reorganization of Consolidated La Sal Mining & Smelting Co., which wa reorganization of La Sal Copper Mining Co. Lands, 7 patented claims and millsites, area 150 acres, known as the Cashin mine, having a 1,540′ tunn showing ore assaying up to 35% copper and 18 oz. silver per ton.

LA SALLE COPPER CO. MICHIGA

Office: 12 Ashburton Place, Boston, Mass. Mine office: Calumet, Hou ton Co., Mich. Quincy A. Shaw, Jr., president; Rodolphe L. Agassiz, vice-pre dent; Geo. A. Flagg, secretary and treasurer; Jas. MacNaughton, general ma ager; preceding officers, Col. Thos. L. Livermore, Courtney C. Douglass a Francis W. Hunnewell, directors; Wm. Skewes and Josiah Bartell, mining ca tains.

Organized, circa December, 1906, under laws of Michigan, with capit ization $10,000,000, shares $25 par. Absorbed the Caldwell Copper Co., a controls, through ownership of practically entire stock issue, the Tecums Copper Co., holding, at last accounts, 54,249 shares, out of a total issue 54,959 shares. Is controlled, through stock ownership, by the Calumet & Hec Mining Co. Tecumseh shareholders received 1½ shares of La Salle for 1 Tecumseh.

Of the capitalization of 400,000 shares, 302,977 were issued for var purposes, leaving 97,023 shares in the treasury. The Calumet & Hecla Min Co. contributed $1,000,000 cash to the treasury, taking pay in shares, and h agreed to loan $750,000 cash, in addition, as needed. Annual report, as of da April 30, 1907, showed total cash resources of $942,272, with liabilities $21,699, and a financial statement, as of date Aug. 19, 1908, gave $870,975 ca and accounts receivable, with accounts payable of $4,496.

Lands, 2,360 acres, also the Gregory millsite on Torch Lake, nearly opp site the Calumet & Hecla mills. The Tecumseh and Caldwell contributed 9 acres each, and 1,240 acres were furnished by the Calumet & Hecla, St. Mary Mineral Land Co., Shelden & Douglass estate and other interests. These lan were put into the new company on a novel basis of valuation, figured upo zones of 2,500′, on the dip of the Kearsarge lode, allowance being made f decreased land values on tracts carrying the underlay at depth. The proper has 4 shafts, 2 on the Tecumseh and 2 on the Caldwell, with room for 2 add

al shafts, giving 7 shafts at intervals of about 1,700'. The property carthe strike of the mineral formation for circa 2½ miles.

Considerable diamond drilling has been done on the tract, and develop- is exclusively on the Kearsarge amygdaloidal bed. In July, 1908, six power ils were running in the Tecumseh branch, and two in the Caldwell branch.

The Tecumseh property is a very irregular tract, lying next south of the eola mine proper, carrying circa 400 acres of the underlay of the Kearsarge . The first work on the Tecumseh was done on the Calumet conglomerate, ere a shaft was sunk circa 1,000', but found no payable copper. During second era of activity, 1899-1902, a shaft was sunk 2,300' on the Osceola gdaloid, but this bed was found practically barren of copper, and work s abandoned, November, 1902. The old Osceola shaft may be reopened, wever, for the reason that the southern drifts from No. 6 shaft of the sola, below the 4,000' level, are among the best in the mine, and these are ar the Tecumseh boundary.

Tecumseh shaft No. 1, sunk on the Kearsarge bed, is 6x18', with 3 comrtments, 1,400' deep, with drifts on the twelfth, thirteenth and fourteenth vels, showing considerable good ground. The workings of No. 1 show typical earsarge amygdaloid, of about 15' average width, with variable mineralizaon, though decidedly promising. The stockpile at No. 1 shaft contains circa ,000 tons of stamp-rock, including some rock of very good grade, carrying nsiderable heavy copper.

No. 2 Tecumseh is about 1,000' south of No. 1, old No. 2 shaft, which was k close to No. 1, having been abandoned. No. 2 is planned as a duplicate of o. 1, in size and equipment.

The Caldwell has 2 shafts, known as Nos. 1 and 2, which also are called e La Salle shafts. These probably will be renumbered eventually. No. 1 aldwell shaft, sunk one mile south of Tecumseh No. 1, has a shaft-rockhouse, nd was 500' deep, October, 1908. No. 2 Caldwell is circa 1,500' southwest of o. 1, and is of the same depth, shafts being duplicate, with hoists good for ne-half mile each. The Caldwell shafts can be sunk to 9,000' depth before eaching the boundary line. The Kearsarge bed, on the Caldwell tract, has en found considerably disturbed to the depth reached, and the showing is oor, but the shafts are not deep enough to give permanent results.

Equipment includes steam plants and compressors at each mine, the Caldell having a 15-drill air-compressor at No. 1 shaft, with a 30x70' boarding- use, barn and several dwellings.

Results at the La Salle have been somewhat disappointing, though a fair owing has been secured in Tecumseh No. 1, but it is obvious that the real lue of the property can be determined only by further extensive develop- ent. This will be secured, as the company is exceedingly strong financially, ith an excellent management.

LA SALLE COPPER MINING & MILLING CO. **NEW MEXICO.**

Mine office: Carrizozo, Lincoln Co., N. M. Geo. C. Hopkins, vice-presi- ent. Organized under laws of Arizona, with capitalization $1,000,000, shares $10 par. Lands, 3 claims, area 60 acres, 6 miles from Carrizozo, said to show a 12' to 15' vein of low-grade copper ore. Company is said to plan building a 0-ton concentrator.

LAS ANIMAS COPPER MINING & SMELTING CO., LTD. **CHILE.**

Office: 2 Rumford Place, Liverpool, Eng. Mine office: Chañaral, Ata- ma, Chile. Edwin Woodgate, chairman; Pedro Nicholas Schiffberg, manag- g director in Chile; F. E. Owens, secretary; Guillermo Sheriff, mine man- er. Organized Jan. 3, 1902, under laws of Great Britain, with capitalization 1,000, shares £1 par, as successor of Copper Corporation of Chile, Ltd. bentures, £54,500, at 6%. Lands, circa 125 acres, including La Fortunata

mine, 430′ deep, opened 1855, and La Alena and El Progreso mines Animas, in the Sierra Aspera.

Smelter, rebuilt 1895, has two 54″ circular blast-furnaces, with C ville and Bocker blowers, employing circa 100 men, at average daily w 3 pesos. Fuel is coke and Australian coal, coke costing 32 pesos per t livered, 1 ton of coke smelting 8 tons of ore, giving slags averaging 0.7 per. Production, 1903, was 3,701,976 lbs. fine copper.

LAS ANIMAS GOLD-COPPER MINING CO. NEW MI

Dead. Formerly at Hillsboro, Sierra Co., N. M. Fully described V

LAS ANIMAS MINING & SMELTING CO. MI

Mine office: Llano, Magdalena, Sonora, Mex. F. A. Huntington manager. Property includes Las Animas, El Purgatorio and other mines, e auriferous and argentiferous copper and lead ores. Has a 40-ton mill 40-ton smelter, employing about 25 men, at last accounts.

LAS COCHES MINING CO. MI

Office: 1085 West 21st St., Chicago, Ills. Mine office: Ures, Sonora Idle.

LAS CRUCES COPPER CO. NEW MI

Mine office: Organ, Donna Ana Co., N. M. J. F. Statley, president; las Gallus, vice-president; Fay Sperry, treasurer; D. F. Baker, sec Lands, 9 claims, known as the Green mine, in the Black Mountain dis miles north of Organ. Said, 1908, to plan a small smelter.

LAS GORITAS MINING CO. MI

Letter returned unclaimed from former office, San Francisco, Cal. office: La Bufa, Sahuaripa, Sonora, Mex. Idle.

LASKAWANDA GOLD & COPPER CO.

Office: 40 State St., Boston, Mass. Location of lands, if any, unkn

COMPAÑIA MINERA DE COBRE "LAS MORAS," S. A. MI

Is the Mexican incorporation of Las Moras Copper Mining Co.

LAS MORAS COPPER CO. MI

Dead. Succeeded by Las Moras Copper Mining Co. Formerly at Jalisco, Mex. Described Vol. VI.

LAS MORAS COPPER MINING CO. MI

Office: 2030 Land Title Bldg., Philadelphia, Pa. Mine office: Jalisco, Mex. Employs circa 50 men. Paul W. Meyers, president; Al Paul, vice-president; A. S. Robert, secretary; L. H. Taylor, Jr., tr Geo. E. McCormick, comisario; preceding officers constitute the board rectors; Jas. P. Harvey, general manager; Jas. M. Campbell, superint

Organized July 7, 1902, under laws of Mexico, with capitalizatio pesos, and capitalization increased, July 17, 1906, to 10,000 pesos, sha pesos par. Property is operated, under lease, by the American corp which is reported as having less than a half dozen shareholders, whi urally, would include the five directors only. Annual meeting, third in July.

Lands, 187 pertenencias, area 462 acres, circa 6 miles southwest of on the Hacienda San Miguel.

The Magistral mine, 8 miles from the Mexican Central railway, has body of 20′ to 30′ width, developed for circa 500′ in length by tunne about 1,500′ of drifts and crosscuts, and a 112′ shaft. Ore is slightl crous and argentiferous chalcopyrite. The Magistral was worked man ago, for production of bluestone, used by neighboring mines in the patio of treating silver-lead ores.

La Fé, or Las Moras, mine, a newly opened property, has an ore b*sisting of* a breccia of altered limestone, with fragments cemented by ch

leopyrite, in a crushed and mineralized contact zone of about 300' width, for circa 2,000', ore averaging 2 to 2.5% copper, with small silver and ues. Development is by a 140' shaft and circa 1,500' of tunnels. ere is a steam plant with a 500' hoist at the Magistral shaft, with a of buildings, and roads have been built. nagement plans deepening both shafts. The property is held, under nd lease, dated July 25, 1907, by Patrick Clark, H. L. Percy and Jos. P. y.

ABLAS COPPER CO. **MEXICO.**

ice: 84 Adams St., Chicago, Ills. Mine offices: Aguacaliente de Baca, , Sinaloa, Mex., and Alamos, Sonora, Mex. Harry Austin Clapp, man- Daniel H. Livingston, superintendent. Property at Aguacaliente de Baca riferous and argentiferous copper ores.

CHANCE COPPER MINING CO. **MONTANA.**

ice: 202 North Main St., Butte, Mont. Mine office: Saltese, Missoula ent. W. H. Nichols, president; Geo. Champagne, vice-president; Dr. T. therspoon, treasurer; S. M. Burns, secretary. Capitalization $1,250,000, $1 par. Lands, 2 claims, known as the Last Chance group, 4 miles of Saltese, said to show a 30' vein, slightly developed by shafts and s showing auriferous and argentiferous copper ore assaying up to 42% r, 450 oz. silver and $8 gold, with a claimed average of 17% copper, 60 ver and $4 gold per ton, which unquestionably is an overestimate. Mine med to have produced about $150,000 worth of ore.

CHANCE COPPER MINING CO. **WASHINGTON.**

ine office: Keller, Ferry Co., Wash. Idle some years and apparently nd.

CHANCE MINING CO. **ARIZONA.**

ead. Succeeded, 1902, by Canyon Copper Co. Formerly at Williams, ino Co., Ariz.

TUSAS MINING & MILLING CO. **NEW MEXICO.**

ine office: Tres Piedras, Rio Arriba Co., N. M. Lon. L. Trout, general ger. Had steam power, electric light and sawmill, and planned building a concentrator, at last accounts.

VEGAS COPPER CO. **NEW MEXICO.**

ice: East Las Vegas, N. M. Mine office: Tecolote, San Miguel Co., F. A. Manzanares, president; J. M. Thompson, secretary; J. M. Allen, ger and general manager; Frank J. Buck, consulting engineer. Capital , $100,000, shares $1 par. Property is the Tecolote mine, showing aurif- and argentiferous copper ore, also a vein of bluestone or natural copper ate. Has steam and electric power, and a concentrator. Company claims e developed about 5,000,000 tons of carbonate ore, but apparently has under the excessive burden and is idle.

VEGAS MINING CO. **MEXICO.**

ice: care of Geo. R. Voorhees, Jr., Santa Barbara, Cal. Mine office: ostones, Coyame, Iturbide, Chihuahua, Mex. Property, leased to Com Minera Castro Señores, S. A., is described under title of that company.

YAQUIS MINING CO. **MEXICO.**

ead. Formerly at El Tiro, Ures, Sonora, Mex.

E COPPER MINING CO. **IDAHO.**

ice: Latah, Wash. Property is one of the numerous Copper in Idaho.

AM MINING & SMELTING CO. **NEVADA.**

ead. Succeeded, circa 1905, by Ohio Land Mining & Smelting at Spreadeagle, Elko Co., Nev.

LATIMER COPPER MINING CO. GEORGI

Mine office: Pierceville, Fannin Co., Ga. Idle some years.

LATOUCHE CONSOLIDATED COPPER CO. ALASK

Office: Seattle, Wash. Mine office: Latouche, Latouche Island, Pr William Sound, Alaska. Organized 1907, under laws of Washington, w capitalization $1,000,000, shares $1 par, by Jas. Denny, W. B. Madison a others. Lands, 5 claims, on the southern end of Latouche Island, adjoini the Reynolds-Alaska, said to show a vein traceable 1½ miles, with a sha shaft about one-half mile from tidewater.

LATOUCHE EXTENSION MINING CO. ALASK

Mine office: Latouche, Latouche Island, Alaska.

LATOUCHE ISLAND COPPER MINING CO., LTD. ALASK

Office: 49 Sullivan Bldg., Seattle, Wash. Mine office: Latouche, L touche Island, Alaska. Jas. A. Murphy, president; Tenning Carlson, first vi president; Winfield S. Jamison, second vice-president; C. E. Bogardus, tre urer; Gordon Everett, secretary; preceding officers, Dudley A. Tyng and R Fay, directors; Philip C. Stoess, consulting engineer. Organized under laws Washington, with capitalization $5,000,000, shares $5 par. Lands, 29 clai well timbered, and a millsite carrying approximately 4 miles of tidewa frontage, on the northeastern shore of Latouche Island, Prince William Sou Alaska, circa 60 miles south of Valdez. Property shows 3 practically par veins, of 8′ to 20′ width, proven by trenches at intervals for 3 miles. Ha shallow shaft and tunnels of 74′, 103′, 160′ and 180′, and claims to have sight approximately 200,000 tons of ore of 5% average copper tenor. H steam power. Company claims 3 first shipments, 1907, returned 4 to 6 copper, from surface ores without assortment. Is said to have expended abo $60,000 on development. Property considered promising.

LATOUCHE MINING CO. ALASK

Letter returned unclaimed from former office, 10 Wall St., New York, Y. Mine office: Latouche, Latouche Island, Alaska. Andrew K. Beatson, g eral manager, in whose name all operations are conducted. Organized 19 under laws of New Jersey, with capitalization $100,000. Is operated as a cl corporation.

Lands, 17 claims, patented, area 340 acres, known as the Bonanza mi on the eastern side and circa 3 miles from the northern end of Latou Island, within one-half mile of tidewater, where there is a good natural harb Country rock is slate, carrying chalcopyrite ranging in tenor up to 30% copp and which averages about 10% copper, 2 oz. silver and 20 cents gold per t Ore occurs in the brecciated portions of the country rock, in irregular ve and occasionally as impregnations or replacements of the country rock, alo a shear zone, considerably brecciated.

The mine is developed by a big quarry, and by tunnels of 320′ and cl 900′, with about 1,800′ of underground workings. There are 5 upraises to s face, of 33′ to 43′ height, fitted with ore bins having steel gates, through wh ore is milled down, giving cheap mining costs. Without power equipment t mine has extracted and loaded ore at a cost of only $2.25 per ton.

The property has a 300′ wharf, on a natural harbor, connected with t mine by a half-mile tramline of 24″ gauge, laid with 12-lb. steel rails. T freight rate to Tacoma, by water, is $2.75 per ton, and ore, being desirable f flux, is smelted at an average cost of $1.65 per ton. The company has a g eral store and employs about 30 men. Production, 1907, was 1,020,000 lbs. f copper and 9,000 oz. silver. The property is one of unusual promise, and developed and managed on sound lines.

LA UNION CONSOLIDATED COPPER CO. MEXIC

Dead. Succeeded, 1907, by Central Consolidated Copper Co. Formerly

Arizpe, Sonora, Mex. Described Vol. VI.

N COPPER MINING CO. **ARGENTINA.**
and works office: Humahuaca, Jujui, Argentina. Has steam power
all smelter. Employed, 1905, circa 100 men. Presumably idle.

IA MINERA LAURA DE HUANTAJAYA. **CHILE.**
: Iquique, Chile. Mine office: Huantajaya, Tarapacá, Chile. Or-
Sept. 26, 1902, under laws of Chile, with capitalization 60,000 pesos,
0 pesos par.

PEARL MINING & MILLING CO. **COLORADO.**
l. Formerly at Newett, Chaffee Co., Colo.

É DES MINES DE CUIVRE DE LAURIOLLE. **FRANCE.**
office: Lauriolle, Basses-Pyrénées, France. Georges Caton, manager.
d April, 1908, under laws of France, with capitalization 5,000,000
hares 100 francs par.

M MINING CO. **MICHIGAN.**
e: 301-199 Washington St., Boston, Mass. Mine office: Houghton,
n Co., Mich. Albert S. Bigelow, president; Norman W. Haire, vice-
t and general manager; Wm. J. Ladd, secretary and treasurer; pre-
fficers, Edward S. Grew and Walter A. S. Chrimes, directors; Wm. J.
neral superintendent. Organized under laws of Michigan, with cap-
n $1,000,000, shares $25 par. Cash on hand, Jan. 1, 1908, was $88,652.
meeting, second Tuesday in June.
ls originally were 640 acres, lying next east of the Calumet & Hecla,
iangular tract of about 65 acres, carrying both surface and mineral
vas sold, many years ago, to the Calumet & Hecla Mining Co., and
0 acres of surface rights have been disposed of since, as building lots,
illage of Larium, mineral rights being reserved, giving the company
holdings of approximately 325 acres of surface rights, with mineral
575 acres. Was prospected slightly, 1904, by diamond drill borings,
e idle.

AD MINERA LAVINIA DE HUANTAJAYA. **CHILE.**
e: Iquique, Chile. Mine office: Huantajaya, Tarapacá, Chile. Or-
Oct. 29, 1906, under laws of Chile, with capitalization 100,000 pesos,
00 pesos par.

EDE CONSOLIDATED GOLD & COPPER MINING CO. **OREGON.**
e: 518 Broadway, Albany, N. Y. Mine office: North Powder, Union
. H. Earle Furman, president; Geo. Oliver, vice-president; W. J.
ecretary; D. Keefer, treasurer; W. N. Gardner, mine manager. Or-
June 10, 1900, under laws of Oregon, with capitalization $1,500,000,
1 par. Lands, 160 acres, well timbered, 3 miles from a railroad, in the
of the Blue Mountains. Development is by several hundred feet of
unnels and crosscuts, showing sundry parallel veins of 10″ to 4′ width,
ores assaying up to 10% copper, with good gold and silver values, and
n iron gangue. Idle since circa 1905.

ILLE MINING CO. **ARIZONA.**
e office: Pearce, Cochise Co., Ariz. Wm. Holmes, general manager.
ation $600,000. Was under bond to Calumet & Arizona, 1906-1907, but
s surrendered. Lands, 18 claims, known as the Leadville group, near
per Bell, in the Turquoise district, having a 280′ shaft showing 24″ to
4% sulphide ore below a depth of 175′, with some copper carbonates

ILLE MINING & SMELTING CO. **MONTANA.**
ce: care of J. F. Upson, secretary and treasurer, Larned, Kans. Mine
Basin, Jefferson Co., Mont. Chas. A. Cottrell, president; John Landis,
sident; preceding *officers, F. J. Brule and F. D. Lowrey,* directors. Ca-

ganized under laws of Arizona, with capitalization $1,000,000, shares $1 p
Lands, 12 claims, area 240 acres, 14 miles from a railroad, having circa
of workings, showing mainly argentiferous galena.

LEALTAD COPPER MINE CO.

Office: care of Dr. René Le Fournier, 5 Blvd. Magenta, Paris, Fra
Organized July, 1907, under laws of New Jersey, with capitalization $500,0

LEASTOCK GOLD & COPPER MINING CO. CALIFORNI

Office: care of L. M. Gregory, general manager, Los Angeles, Cal. A
drew Glassell, president; E. H. R. Stone, secretary. Organized 1905, un
laws of Arizona, with capitalization $1,000,000, shares $1 par. Lands,
claims, on the northern side of New York Mountain, San Bernardino coun
California, having about 500′ of workings, showing some ore assaying up
9% copper.

LEEDS COPPER CO., LTD. QUEBE

Dead. Formerly at Broughton Station, Beauce Co., Quebec.

LEEDS COPPER WORKS. ENGLAN

Works office: Hunslet, Leeds, Yorkshire, Eng. Works include an elec
lytic refinery of 10 to 12 long tons daily capacity, having four 170-kw. g
erators, with 216 tanks, using the Elmore arrangement of electrodes, and tr
ing mainly Chile bars averaging about 96% in copper tenor.

LEHIGH & ARIZONA MINING CO. ARIZON

Office: 43 Wall St., New York, N. Y. Mine office: Chloride, Mohave
Ariz. Franklin H. Griffith, general manager. Lands, in the Hualapai distr
include the Minnesota-Connor, Merrimac and Manzanita mines, having
veins of about 6′ average width, carrying sulphide ores assaying 1 to 2
copper, 15 oz. silver and $6 gold per ton, with a little lead. Mine has sh
20 pits and shafts of 20′ to 600′ depth, and a 3,500′ tunnel. Has steam
electric power, 10-stamp mill and a 150-ton concentrator. Property consi
valuable.

LEICHHARDT-CLONCURRY DEVELOPMENT CO., LTD. AUSTRALI

Office: 398 Collins St., Melbourne, Australia. Mine office: Clonc
Beaconsfield Co., Queensland, Australia. V. J. Saddler, chairman; P.
Hughes, secretary; J. R. Peberdy, mine manager. Lands include sev
groups, principal being the Dugald mine, having a number of shallow
showing ore averaging circa 15% copper. In 1906 shipped 53 tons of ore,
about 30% average copper tenor. Employed 30 men at last accounts.

LEICHHARDT COPPER CO. AUSTRALI

Office: Queen St., Brisbane, Queensland, Australia. Capitalization £62,

LEIGHTON GENTRY COPPER CO. WYOMI

Dead. Succeeded, 1904, by Independence Mining Co. Formerly at R
lins, Carbon Co., Wyo.

LEIGHTON-WYOMING COPPER CO. WYOMI

Office: Milwaukee, Wis. Mine office: Dillon, Carbon Co., Wyo. A.
Welles, president; C. W. Hendrick, vice-president; Edgar L. Fowler, secreta
E. J. Henning, treasurer. Organized 1906, with capitalization $1,000,000, sh
$1 par. Lands, 8 claims, in the Battle Lake district, about one mile north
Dillon, having about 200′ of openings, said to show 10% copper ore.

LELAN GOLD & COPPER CO. ARIZO

Mine office: McCabe, Yavapai Co., Ariz. Elmer W. Wells, manager.
gasoline power and a 10-stamp mill.

LENA MINING CO. NEW MEXI

Dead. Formerly at Londsburg, Grant Co., N. M.

LENAWEE MINING, MILLING, TUNNEL & TRANSPORTATION CO. COLO

Mine office: Dillon, Summit Co., Colo. Jas. H. Meyers, superinte

ous and argentiferous copper ores, with steam plant and 20-stamp

INING & MILLING CO. **UTAH.**
care of P. C. Evans, secretary, Salt Lake City, Utah. Letter re-
imed from former mine office, Milford, Beaver Co., Utah. Miles
resident; J. D. Carpenter, general manager. Organized Dec. 19,
s, 9 claims, known as the Lenora group, in Beaver county, Utah.
years.

IOUNT SICKER COPPER **BRITISH COLUMBIA.**
G CO., LTD.
Sold, 1907, to Vancouver Copper Co., Ltd. Formerly at Duncans,
Island, B. C. Fully described Vol. VI.

OPPER MINING CO.
Formerly had an office 412 Tremont Bldg., Boston, Mass.

XTENSION MINES CO. **MONTANA.**
and mine: Sheridan, Madison Co., Mont. C. E. Lentz, manager.

OLD-COPPER MINING & REDUCTION CO. **MONTANA.**
964 Penn Ave., Pittsburg, Pa. Mine office: Sheridan, Madison
C. E. Lentz, president and general manager; F. J. Mangus, vice-
R. P. McChesney, secretary and treasurer; S. E. Brimm, superin-
Organized under laws of Arizona, with capitalization $3,000,000,
par. Annual meeting, third Friday in February.
11 claims, area 220 acres, and a 20-acre millsite, in the Tidal Wave
miles from the Northern Pacific railway, showing granite-porphyry,
quartzite, said to carry 10 ore bodies, occurring as fissures in por-
as contacts between limestone, gneiss and granite, of which 3, under
t, are claimed, by the company, to have average widths of 16′ to
trong gossans, and are claimed to carry all varieties of copper ore,
mainly oxidized, of estimated average values of 2% copper, 12 to
12 to 1,400 oz. silver and $8 to $600 gold per ton. Property is opened
f 30′, 130′, 60′ and 110′, and by tunnels of 80′, 100′, 120′ and 1,600′,
l of circa 4,800′ of workings, estimated by company to show 8,000
gh-grade ore, and 160,000 tons of low-grade ore, which figures are
excessive, as are the estimated average values.
y claimed, 1906, to have an air-compressor and two 60-h. p. hoists,
ll mine buildings, but neither hoist nor compressor were erected.
ern Star mine of the company is in litigation. Property has been
me time, and company apparently is moribund.

ONORA y HUERTA. **MEXICO.**
care of James M. Daniel, owner and general manager, Apartado
alientes, Mex. Mine office: Villanueva, Zacatecas, Mex. Jas. M.
, superintendent and engineer; Manuel Varila, mine superintendent.
acres, also 500 acres miscellaneous lands, in the Jalpa district,
fissure vein in porphyry, of 10′ average width, carrying argentif-
s, argentite, melaconite and azurite, with clay gangue, said to give
turns of about 5% copper, 10% lead, 200 oz. silver and 29 milligrams
n. Mine, opened circa 1820 and reopened 1883, has shafts of 300′
with about one mile of underground workings. Has a steam plant
centrator with one crusher and 12 planillas, for treating low-grade
centrates and smelting ores are shipped, 75 miles, by burros, to the
ates smelter.

MINE. **MONTANA.**
by Boston & Montana Consolidated Copper & Silver Mining Co.

E CONSOLIDATED MINING CO. **ARIZONA.**
care of *Meredith E. Lawson, president,* Parkersburg, W. Va. Mine

office: Poland, Yavapai Co., Ariz. Lands, 8 claims, in the Big Bug district, bought Jan. 1, 1908, of Alto Mines Co., having a shaft, planned to be sunk 600', showing ores assaying up to 4.9% copper and $200 gold per ton.

LEOPOLD-TYRONE COPPER CO. NEW MEXICO

Office: Kreider Bldg., San Francisco, Cal. Mine office: Tyrone, Grant Co., N. M. Frank L. Kreider, general manager; G. A. Eastman, superintendent. Organized 1907. Lands were 6 claims, near the Copper Gulch, having a 2-compartment shaft showing sulphide ore of fair copper tenor. Is said to have sold its lands to the Copper Gulch, and presumably is out of business.

LEPANTO MINING CO., INC. PHILIPPINES

Office: Calle Carnero Núm. 20, Manila, Philippines. Mine office: P. O. Box 964, Mancayan, Lepanto, Luzon, Philippines.

LERIDA COPPER MINES, LTD. SPAIN

Dead. Voluntarily liquidated, September, 1902. Formerly in Lérida, Spain.

SOCIEDAD ANONIMA MINERA BELGA DE LOS COBRES DE LERIDA y GRANADA. SPAIN

Dead. Voluntarily liquidated, September, 1902. Formerly in Lérida, Spain.

COMPAGNIE CUIVRES DE LÉRIDE-GRÉNADE. SPAIN

Dead. Voluntarily liquidated, September, 1902. Formerly in Lérida, Spain.

LE ROI MINING CO., LTD. BRITISH COLUMBIA

Office: 541 Salisbury House, London, E. C., Eng. Mine office: Rossland, Trail district, B. C. Employs 250 men. T. D. Grimke-Drayton, J. P., chairman; Anthony J. McMillan, managing director; preceding officers, G. W. Wesson and Chas. Dunderdale, directors; Andrew Larson, superintendent; Thos. Kiddie, smelter superintendent; Harold A. Wesson, secretary; W. A. Carlyle, consulting engineer. Organized June 7, 1898, under laws of Great Britain, with capitalization £1,000,000, shares £5 par, fully issued and fully paid. Has paid dividends as follows: 5s., Nov. 7, 1899; 1s. 6d., March 3, 1906; 2s., September, 1906. For fiscal year ending June 30, 1907, profit was £3,582 4s. 3d., with surplus of liquid assets of £74,259 19s. 4d. Controls, through stock ownership, the Northport Smelting & Refining Co., Ltd. Fiscal year changed, 1907, to end Sept. 30, instead of June 30.

Lands, 71.45 acres, freehold, and the I. X. L. mine, held under lease, also a limestone quarry for fluxing, and the Spitzee and Townsite claims are held under option. In 1907 did 3,740' of diamond drilling, and made nearly one mile of new mine openings, expending $164,468.99 on exploratory and development work. The ore body is narrow at the top and wider at the bottom, but carries decreased values at depth, the bottom of the mine showing 3' to 5' of good smelting ore, with a continuance of the vein to considerably greater depth proven by diamond drill borings made from the bottom of the shaft. Ore averages about 1.2% copper, 0.5 oz. silver and 0.4 to 0.5 oz. gold per ton.

The 5-compartment main shaft is 1,650' deep, and, in 1907, produced ore from levels down to and including the 1,350'.

Equipment includes a good mining plant, with hoists, air-compressors, a steam shovel, and the property is supplied with necessary shops and mine structures.

The reduction plant, at Northport, Washington, 17 miles from the mine, is held through the Northport Smelting & Refining Co., Ltd. The works, 1,200 tons daily capacity, are modern in design and equipment. Limestone fluxing is secured from the company's quarry, 4 miles distant, and water supplied from Deep Creek, through a 4x5' flume of 3 miles length, to two 125,000-gallon storage tanks, whence water is brought to the works in pipes, under a head of 145', with an effective pressure of 60 lbs. per *inch, actuating* 18" and 24" Pelton water-wheels.

Trail district, B. C. Employs circa 100 men. Lord Ernest Hamilton, chairman; preceding officer, A. B. Deltry, F. C. D. Haggart and W. T. Morrison, directors; Paul E. Couldrey, mine manager; R. R. Cormack, assistant manager; F. A. Labouchere, secretary; Alex. Hill & Stewart, consulting engineers.

Organized June 1, 1900, under laws of Great Britain, with capitalization £600,000, shares £5 par, fully issued and fully paid. Has paid dividends as follows: 5s. in 1901; 5s. in 1902; 2s. in 1904; 3s. in 1905; 8s. in 1906; 3s. in 1907; 4s. to August, 1908. For year ending Sept. 30, 1907, net profit was £13,806 5s. 1d., after writing off £11,944 12s. 8d. for depreciation. From organization to Sept. 1, 1908, company paid dividends of £180,000. The company holds a share interest in the Cloncurry Syndicate, Ltd.

Lands, 72 acres, including the Josie No. 1 and Annie mines, also 8 claims near the old mine, 2 claims near the Velvet mine and 5 claims in the Ym district. Upwards of one mile of diamond drill borings were made in 190 and 3,286' of new mine openings were made in the same year. Ores carr values in gold, copper and silver, in the order named, and are graded into tw classes, for smelting and concentrating, latter grade ranging 0.4 to 0.5% copper tenor, with only about 20% of the copper saved, extraction of ass values in gold being 56 to 60%.

Development is by a 900' main shaft, on the Josie, and by 2 tunnels on the Josie and one on the Poorman claim. The mine has ore reserves estimat at 300,000 tons, which seems high, and has some ore chutes of considerab better than the average grade of the Rossland camp.

The mill, of 50 tons rated daily capacity, has Blake and Gates crushers, Chilean mills, 3 Jenckes sizers and 6 Wilfley tables. An Elmore oil conc trator, fully described Vol. IV, was installed 1903, proving a technical but a commercial success, and was superseded by Wilfley tables. Concentrat carry circa 1.8% copper, 1.5 oz. silver and 1.75 oz. gold per ton.

Production has been as follows: 980,000 lbs. copper, 27,968 oz. silver a 11,050 oz. gold in 1904; 885,992 lbs. copper, 28,369 oz. silver and 14,493 oz. g in 1905; 803,409 lbs. copper, 22,054 oz. silver and 19,615 oz. gold in 1906. 1907 production was 22,198 tons of ore shipped, and 12,963 tons of ore conc trated. Largest copper production was 3,001,027 lbs., for fiscal year 190 Smelting ore, 1905, returned 3.62% copper, 2.32 oz. silver and 1,184 oz. g per ton. Management is good and property is valuable.

LE ROY MINING CO. MEXI

Mine office: Pilares de Teras, Moctezuma, Sonora, Mex. Has auriferou and argentiferous copper ores. Idle.

LESLIE COPPER MINING CO. IDA

Office: Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. W ley Everett, manager. Organized February, 1899, under laws of Idaho, w capitalization 100,000, shares 10 cents par. Lands, 11 claims, area 220 ac also a millsite and 2 water rights, lying east of Mullan, showing 4 ve traversing porphyry, main vein averaging circa 12' width at surface, op by tunnel, with about one mile of workings, carrying silver-lead ore of c centrating grade, with a narrow copper paystreak. Has water power, a 5-dr air-compressor and several mine buildings.

L'ETETE GOLD & COPPER MINING CO. NEW BRUNSWICK & NOVA SCOTI

Mine office: L'Etete, Charlotte Co., N. B. Property is the old J mine, opened circa 1860, reopened 1902, having two short tunnels and main shaft, showing ore of good assay value. Has a steam plant, and facilities at tidewater. Company also owns mineral lands in Nova *Idle several years.*

...ng Bureau of Engineering.

...CLARK MINING CO.

...ead mine: Mullan, St. ...
...daho, with capitalization ...
...rs. Lands, 12 claims, ...

...HN EXPLORATION & MINING ...

...e: 344 11 Broadway, N...
...; Martin H. Vogel, con...
...sey, with capitalization $7...
...15,000 tons, by easy stages, ...
...nd finance are understood ...
...; Sneiders Securities Co., ...
...l ... ag company for the ...
...Copper Co., Miami Copper ...
...able share interests in the N...

...TON MINE. ...

...ed by La France Copper Co.

...NIA MINERA LIBERTAD DE SANTA ... ...

...e: Iquique, Chile. Mine ...
Nov. 13, 1904, under laws of ...
...pesos par.

...Y COPPER MINING CO. ...

...e office: Chewelah, Stevens Co., ...
...erty, vice president; L. Bryan, ...
S. G. Neff and W. W. Morris, ...
...med, said to show a 7' vein ...

...Y COPPER MINING & MILLING ...

...d. Property sold to Virgin...
...wn, Frederick Co., Md.

...Y GOLD & COPPER CO. ...

SOCIETÀ ANONIMA PER L'ESERCIZIO DELLA MINIERE DI LIBIOLA. ITA

Mine office: Sestri Levante, Liguria, Italy. Property is leased to Lib Copper Mining Co., Ltd.

LIBIOLA COPPER MINING CO., LTD. ITA

Office: 138 Leadenhall St., London, E. C., Eng. Mine office: Se Levante, Liguria, Italy. Kenneth Haweis James, chairman; preceding offi Thomas V. Anthony and Albert Straube, directors; W. S. Bartlett, secreta Robert H. Craven, mine manager. Organized January, 1867, under laws Great Britain, and reconstructed, 1888, with capitalization £250,000, shares par. Paid dividends of 2s. 6d. in 1903; 3s. 6d. in 1904, and 3s. 6d. in 1905, total dividends, to end of 1905, of £4 10s. Net earnings, 1907, were £7, with dividends of £7,560. Company has a heavy share interest in the Cruc silver-lead mine, Sardinia, now idle.

Lands, 2 claims, area circa 700 hectares, freehold, including the Lib copper mines, in Liguria, northern Italy. Ores are chalcopyrite and pyrites, occurring as veins in serpentine and diabase, ore bodies being of size. The property was discovered and worked by the Romans, and was opened, 1867, by predecessor of present company. Ores produced ave 5.76% copper in the cupriferous ore and 46.75% sulphur in the pyrites.

Equipment includes a 60-h. p. steam plant, 30-h. p. water plant and 50 electric plant.

The crushing mill, covering 550 square meters, built of reinforced conc and stone, has a daily capacity of 180 tons. Production, 1905, was 28,388 of copper and iron pyrites, of which about 20% was copper ore. Compan well managed, and, by careful handling, the property is made to return s factory profits.

SOCIÉTÉ DES MINES DE LA LIENNE. ITA

Mine office: Alagna, Circondario di Varallo, Novarra, Italy. Also property at Riva, near Alagna. Ore is disseminated chalcopyrite of low medium copper tenor, and mines were worked on a small scale only, at last counts.

SOCIETÀ LIGURE RAMIFERA. ITA

Mine office: Casarza, Liguria, Italy. Property includes the Fontana Rio Albareta, Rio Monticello and Rio dei Fichi mines, carrying chalcopy in a quartzose gangue. Was a small producer, at last accounts.

LILBURN MINING CO. UT

Dead. Lands sold, 1908, to Alta-Hecla Mining Co. Formerly at Alta, S Lake Co., Utah.

LILLY MINING & MILLING CO. COLORA

Mine office: Idaho Springs, Clear Creek Co., Colo. Ores carry gold, sil lead and copper. Has steam power. Presumably idle.

LILYAMA MINE. CALIFORN

Office: care of Robt. Crocker & Co., Placerville, Cal. Mine office: burn, El Dorado Co., Cal. Lands, 240 acres, unpatented, 11 miles from Aub Ores, mainly sulphides, occur as lenses in limestone and between granite quartz-porphyry. Has 4 tunnels and a prospecting shaft. Idle some years

LIMA COPPER MINING SYNDICATE, LTD. PE

Dead. Voluntarily wound up, February, 1903. Formerly in Perú.

LIME CREEK CONSOLIDATED GOLD & COPPER CO. ARIZO

Dead. Property sold to Kentucky-Arizona Consolidated Mining, Smel & Development Co. Formerly at Cave Creek, Maricopa Co., Ariz.

***LIME* MOUNTAIN COPPER CO.** ARIZO

Mine office: Johnson, Cochise Co., Ariz. Organized 1906, under law

ons, with capitalization $1,000,000, by Davis S. McGahan and I. N. Katbroth. Lands, 21 claims, known as the George Washington group, near Empire mine, in the Dragoon Mountains, developing by tunnel.

IMEN COPPER SYNDICATE, LTD.

Office: 2 Broad Street Place, London, E. C., Eng. R. A. Paris, secretary. nized Apr. 29, 1907, under laws of Great Britain, with capitalization 0, shares £1 par; issued, 711 shares, fully paid. Location of lands, if any, own.

ON MINING CO. **MEXICO.**

Mine office: Alamos, Sonora, Mex. Geo. W. Avery, superintendent. Has rous and argentiferous copper ore, with 10-stamp mill.

ARES MINING SYNDICATE, LTD. **SPAIN.**

Mine office: Linares, Jaen, Spain. S. Moos, manager. Organized 1903, to it lead, copper, zinc, iron and coal properties in vicinity of Linares, and nstruct a warehouse and shipping pier at Almería, Spain. Idle.

OLN CONSOLIDATED COPPER CO. **NEW MEXICO.**

Office: care of Daniel D. Hunt, St. Joseph, Mo. Mine office: Jarilla, Co., N. M. M. E. Riggs, president; T. D. Hosmer, vice-president; Geo. , secretary and treasurer; Wm. Wade, general manager; preceding officers, F. Standley, Thos. Winn, Chas. P. Faul and Reinhold Meiershoffer, ors. Organized Apr. 13, 1906, under laws of New Mexico, with capitaln $50,000. Lands, 2 claims, said to be held under bond and lease from west Smelting & Refining Co., showing a 5′ vein carrying ore of 4 to 6% tenor, with fair silver values, opened by a shallow 2-compartment shaft. d ore, 1907, to El Paso smelter, first shipment returning circa 11% copper oz. silver per ton. Shipments, 1907, were said to have been sufficient for development work.

OLN CONSOLIDATED MINING CO. **ARIZONA.**

fice: 1563 Sherman Ave., Evanston, Ills. Mine office: Tucson, Pima riz. Employs 30 men. Chas. A. Wightman, president; Hon. Fred W. t, vice-president and general manager; Geo. E. Fernald, secretary and er; D. B. Bisbee, superintendent. Organized June, 1904, under laws of a, with capitalization $2,000,000, shares $1 par. Lands, 35 claims, area res, including the Garcia group of 31 claims, also a 100-acre millsite, otal holdings of circa 1,000 acres, in the Papago district, 12 miles from Buttes railroad, showing country rocks of limestone, granite-porphyry orite, carrying various ore bodies, of which 5, slightly developed, range 3′ in width, being opened by 6 shafts, of 50′ to 120′ depth, and by a nnel. Smelter shipments are said to have given average returns of circa pper, with fair gold and silver values, and property is claimed to have d about $80,000 worth of ore. Equipment includes two 15-h. p. gasoline good for 400′ depth, and a 15-drill Rand air-compressor. There are 5 gs, including an 18x20′ machine-shop, 14x60′ smithy, store and several gs. Idle.

OLN COPPER CO. **ARIZONA.**

ad. Succeeded, circa 1904, by Lincoln Consolidated Mining Co. Forat Tucson, Pima Co., Ariz.

OLN COPPER DEVELOPMENT CO. **CALIFORNIA.**

ad. Was promoted by "Baron" W. E. von Johannsen, a notorious swindler who formerly had an office at 326 Post St., San Francisco, Cal.

OLN COPPER MINING CO. **ARIZONA.**

ad. Formerly at Tucson, Pima Co., Ariz. Described Vol. III.

OLN COPPER MINING CO. **MONTANA.**

ice: care of Jas. A. Talbot, Butte, Mont. Mine office: Helena, Lewis Co., Mont. *Organized July, 1903, under* laws of Montana, with cap-

italization $1,500,000, shares $1 par. Among the incorporators given was Th H. Carter, but Senator Carter states that his name was used without his know edge or consent. Lands are said to be 10 claims, in the Little Boulder distri about 30 miles from Helena. Idle and apparently moribund.

LINCOLN GOLD & COPPER MINING CO. GEORGI

Office: 33-42 New St., New York, N. Y. Mine office: Metasville, Wilk Co., Ga. Edgar L. Pierson, president; G. S. Macdonald, vice-president; Lou Enricht, secretary; Wm. M. Orr, treasurer; preceding officers and Wilson Mendall, directors; A. B. Hopkins, general manager; Carl Henrich, engine Organized June 11, 1906, under laws of Oklahoma, with capitalizati $2,000,000, shares $1 par; issued, $1,700,000. Paid one dividend, of one-half 1%. Was practically the successor of the Seminole Mining Co., which was bad failure. Annual meeting, first Tuesday in August.

Lands, 901 acres, freehold, known as the Magruder or Seminole mine, ju over the Wilkes county line, 12 miles from the Georgia Central railroad, a circa 70 miles from Ducktown, Tennessee, though advertised by the compa to be in the same mineral zone. Property shows Huronian or Laurenti schists, intruded by eruptive dykes of two different ages, carrying 4 approx mately parallel ore bodies, in schists and between schists and eruptive rock these having an average strike of N. 30° E. to N. 40° E. and dip of 50° vertical, veins averaging 3′ to 14′ in width, and traceable circa 1,200′, showi mainly chalcopyrite, with some bornite, cuprite and melaconite, estimated company to average 4.5% copper, 3% lead, 1.5% zinc, 4 to 5 oz. silver a $6 to $14 gold per ton, which figures are considered unduly high.

The mine, opened 1852, and closed 1862, on account of the American Ci War, was reopened 1878, 1899 and 1905. Development is by a 225′ main shaf a 150′ air-shaft and shafts of 40′, 45′ and 80′, with about 1,800′ of working estimated to show 15,000 tons of ore, with 2,500 tons blocked out for stoping.

Equipment includes a 175-h. p. boiler, 12-h. p. and 15-h. p. hoists and 4-drill Rand air-compressor. There are 10 buildings, including a machine-shop smithy, assay-office and boarding-house.

The mill, 30x70′, of wood, on stone foundations, has a Gates crusher, centrifugal crusher, set of rolls, Twentieth Century jig, 2 Bartlett tables, elevator and revolving screens.

The smelter, immediately adjoining the concentrator and very close to the mine, has a 16-ton rectangular water-jacket blast-furnace, and a 10-ton reverberatory furnace, making, when in operation, a matte of 15 to 20% copper tenor, carrying circa 20 oz. silver and 1.5 to 3 oz. gold per ton, shipped to the Maurer works of the American Smelting & Refining Co. for reduction, first class ore and concentrates also being shipped to Maurer.

The advertisements of J. M. Percy & Co., fiscal agents of the company were most misleading. Dividends were promised for 1907, and a small dividend was paid, May 1, 1907, but it is extremely doubtful if it was earned. Company reports difficulty in securing satisfactory labor, and plans colonizing white labor. Property considered promising.

LINCOLN MINING CO. AUSTRALIA

Mine office: Lincoln, Canbelego Co., N. S. W., Australia. Organized 190 under laws of New South Wales, with capitalization £4,500, shares £10 par.

LINCOLN MINING & MILLING CO. COLORADO

Mine office: Idaho Springs, Clear Creek Co., Colo. Ores carry gold, silver copper and lead. Has steam power and a 15-stamp mill. Presumably idle.

LINCOLN-NEVADA MINING & MILLING CO. NEVADA

Letter returned unclaimed from former mine office, Ely, White Pine Co. Nev. W. M. MacSherry, president and general manager. Capitalizatio *$1,000,000*, shares $1 par. Idle and apparently moribund.

NDSEY CANANEA COPPER CO. **MEXICO.**

Office: care of C. O. Barrow, clerk, Portland, Me. Letter returned un-imed from former mine office, La Cananea, Arizpe, Sonora, Mex. Organized 7, under laws of Maine, with capitalization $5,000,000. Supposedly out of iness.

NEDALE WEST CHILLAGOE, LTD. **AUSTRALIA.**

Dead. Lands sold to Irvinebank Mining Co. Formerly at Arbouin, Chil-e, Queensland, Australia.

NGANORE COPPER CO. **MARYLAND.**

Office and mine: Frederick, Frederick Co., Md. T. A. Dunshee, president general manager; W. F. Wilson, secretary; C. C. Ausherman, treasurer. anized under laws of Arizona, with capitalization $1,000,000, shares $1 par. ds, 306 acres, including the New London and Dolly Hyde mines.

The New London mine, area 64 acres, with 14 acres of timber land, was rked, 1835-1855, apparently at a profit, but was idle since 1881, excepting for vatering and retimbering the shaft, 1903-1904, when no ore was extracted, ll reopened by present company. Mine has a 210′ shaft and 4 short tunnels, gest 104′, with circa 500′ of workings, and the new management has opened 50′ tunnel. Ores are bornite and chalcocite, in a vein of 3′ to 4′ width, in omite and phyllite, ores assaying 3.5 to 7% copper.

The Dolly Hyde was the principal copper mine of the state, though never arge producer, and, in early days, shipped, without selection, considerable of good average tenor. The mine has contact deposits in limestone, carry-malachite, bornite and chalcopyrite, and was idle for many years. Property sidered promising and management good.

NWOOD GOLD & COPPER CO.

Dead. Was promoted by Henry T. Rodman & Co. "Big Mitt" Bill Henig, altogether unknown to the metropolitan police, was secretary. Apparently pany had no lands, and was a swindle, pure and simple. Formerly had an e at 303-334 Fifth Ave., New York, N. Y.

N COPPER CO. **WASHINGTON.**

Dead. Was organized 1906, with capitalization $1,000,000, shares $1 par. ds were in the Hoodoo district. Office was at Wallace, Idaho. Formerly Palouse, Whitman Co., Wash.

N COPPER MINING CO. **ARIZONA.**

Office: 313 West Second St., Los Angeles, Cal. Mine office: Stoddard, apai Co., Ariz. Chas. Matthews, president; O. A. Cox, secretary and treas-; Henry Reifsnyder, general manager. Organized February, 1903, under s of Arizona, with capitalization $2,500,000, shares $1 par, succeeding Ram-Copper Mining Co. Lands, 13 claims, area 260 acres, in the Agua Fria rict, 6 miles from a railroad. Country rocks are limestone, quartzite and phyry, showing numerous veins carrying oxide, carbonate and sulphide ores, med to give average assays of 24% copper, opened by shafts of 50′, 100′ 300′, with 515′ of underground workings. Has gasoline power. Idle and arently moribund.

N GULCH DEVELOPMENT CO. **MONTANA.**

Office: 807 Lonsdale Bldg., Duluth, Minn. Mine office: Homestake, Jef-son Co., Mont. Chester A. Congdon, manager; John Hewett, superintendent. ds, 5 claims, 3 miles north of Homestake and only a few miles south Butte. Property, formerly held by Gold Flint Mining Co., produced con-erable gold and silver in the past, but shows increasing copper values at th. New development is by a 3-compartment shaft, planned to be sunk '. Equipment includes a double-drum hoist and an Ingersoll air-compressor. ploys circa 25 men. *Property considered promising.*

LISBON VALLEY COPPER CO. UTAH.

Office and mine: care of H. E. Blake, manager, Moab, Grand Co., Utah. Was said, 1907, to plan a 100-ton concentrator, but mill apparently not built.

LITHGOW SMELTER. AUSTRALIA.

Owned by Great Cobar, Ltd.

LITTLE BEAVER MINING & REDUCTION CO. UTAH.

Office: Salt Lake City, Utah. Mine office: Milford, Beaver Co., Utah. W. W. Little, president; Samuel A. Tarbet, vice-president; Victor B. Wells, secretary and treasurer. Organized 1908, with capitalization $250,000, shares $1 par. Lands, known as the Kittie Clough group, are in the northern part of the Star district.

LITTLE BILLY OPERATING CO. BRITISH COLUMBIA.

Mine office: Van Anda, Texada Island, B. C. Property is the Little Billy mine. Idle.

LITTLE BOPPY COPPER MINING CO., LTD. AUSTRALIA.

Mine office: Cobar, Robinson Co., N. S. W., Australia. Organized 1907. Property is a lease of copper lands about 20 miles from Cobar, on the railroad to Nyngan.

LITTLE BULLY HILL MINING & SMELTING CO. CALIFORNIA.

Letter returned unclaimed from former office, San Francisco, Cal. Mine office: Winthrop, Shasta Co., Cal. Capitalization $1,000,000, shares $1 par. Lands, 5 claims, said to adjoin the Bully Hill mine, said to be opened by a 130′ tunnel and several trenches, said to show sulphide ore. Prospectus was filled with bunco-talk, and apparently company is moribund.

LITTLE CHIEF MINING CO. UTAH.

Office: care of John R. Van Evera, president, Marquette, Mich. Mine office: Eureka, Juab Co., Utah. F. D. Kimball, vice-president; Jas. P. Driscoll, secretary and treasurer; preceding officers and H. T. Moritz, directors; John Driscoll, superintendent. Has a 1,400′ shaft. Hoisting plant, valued at $15,000, was burned September, 1908. Reorganization planned. Property considered promising.

LITTLE EDDIE GOLD & COPPER MINING CO. UTAH.

Office: Bingham Canyon, Salt Lake Co., Utah. Edw. McCarrick, general manager. Development is by tunnel, said to show a fair ore body.

LITTLE GIANT MINING, MILLING & SMELTING CO. WASHINGTON.

Dead. Formerly at Marcus, Stevens Co., Wash.

LITTLE MATTIE MINING, MILLING & POWER CO. COLORADO.

Mine office: Idaho Springs, Clear Creek Co., Colo. F. V. S. Leebrick, superintendent. Has auriferous and argentiferous lead and copper ores. Equipment includes steam and water power and a 20-stamp mill.

LITTLE MINAH MINE. MONTANA.

Owned by Parrot Silver & Copper Co.

LITTLE NORTH FORK COPPER MINING & MILLING CO., LTD. IDAHO.

Office and mine: Wardner, Shoshone Co., Idaho. F. P. Matchette, president; J. W. Slayter, vice-president; W. J. Locke, secretary; T. R. Mason, treasurer and general manager. Organized September, 1903, under laws of Idaho, with capitalization $1,500,000, shares $1 par. Development is by tunnel. Employs 3 men.

LITTLE YERINGTON COPPER-GOLD MINES CO. NEVADA.

Office: P. O. Box 633, Goldfield, Nev. Mine office: Yerington, Lyon Co., Nev. Lands, 4 claims, area 80 acres, on the Walker Lake Indian reservation. At last accounts company was peddling stock on the weekly installment plan. Is not regarded favorably.

LIVE OAK COPPER MINING & SMELTING CO. ARIZONA.

Office: 438 Broome St., New York, N. Y. Mine office: Globe, Gila Co., *Ariz. Forest* J. Kaldenberg, Sr., president; Forest J. Kaldenberg, Jr., secre-

ry. Organized under laws of Arizona, with capitalization $1,250,000, shares par.

Lands, 16 claims, area 320 acres, 8 miles from a railroad, showing schists ad quartz-porphyry carrying 8 lenticular contact deposits, of which 3, under evelopment, average circa 10′ width by 700′ proven length and 300′ estimated verage depth. Ores are chalcocite, chalcopyrite, chrysocolla and dioptase, aid to give average returns of 10% copper. Mine, opened 1897, has shafts f 85′ and 250′, and tunnels of 900′, 125′, 175′, 185′, 725′ and 60′, with a total f about one mile of workings, estimated by former manager to show 120,000 ons of ore, with 65,000 tons blocked out for stoping, which latter figure is considered excessive. Ore shipped was graded into first class, carrying circa 2% copper, and second class, averaging about 12% copper.

Equipment includes a 200-h. p. hoist, good for 1,500′ depth, and an 8-drill Sullivan air-compressor. Fuel is crude petroleum. The mine has ore-bins and 12 buildings.

There was a serious dispute, with extensive litigation, 1906, between the company and Jos. C. Erman, then the company's agent and superintendent. On Aug. 10, 1905, the company accepted Mr. Erman's offer to ship enough ore to erect a leaching plant, without calling on the company for funds. The company states that Mr. Erman made contracts for the shipment of about 30,000 tons of ore to the El Paso smelter, without the knowledge of the company, and to the company's detriment, and at the end of 30 days began to make leases without the knowledge of other officers, despite the fact that Mr. Erman was not authorized to make any leases, and specifically instructed to make no debts. The company charges that Mr. Erman did not send correct copies of leases to the New York office. Boone & Strang, the principal lessees, are said to have taken out about $100,000 worth of ore, after which the workings caved in, necessitating the sinking of a new shaft. The father of Mr. Erman is said to have found a purchaser for the property, whereupon the lessees demanded $150,000 for the cancellation of their leases, and the company claims that Mr. Erman and his father were to have received a portion of the $150,000. The company charges that fraudulent leases were made, by Mr. Erman, to his friends, his wife, and others, in which leases he himself was interested, and Mrs. Erman, who was the bookkeeper of her husband, is said to have destroyed the books. Mr. Erman is also charged with having given a lease shortly before his discharge, predating same 4 months.

Production has been as follows: 587,961 lbs. fine copper in 1905; 1,714,074 lbs. in 1906; 588,347 lbs. in 1907. Property considered valuable.

LIVERMORE GOLD & COPPER MINING CO. **WYOMING.**

Dead. Formerly at Laramie, Albany Co., Wyo.

LIVERPOOL SILVER & COPPER CO., LTD. **ENGLAND.**

Works office: Widnes, Lancashire, Eng. Property is a reduction plant with an electrolytic refinery.

LIVINGSTONE MINING CO. **MEXICO.**

Office: 1a, Independencia 22, Mexico, D. F. Mine office: Temascaltepec, Mexico, Mex. Has auriferous and argentiferous copper and lead ores.

LLANO COPPER CO. **MEXICO.**

Office: 407 American Bank Bldg., Kansas City, Mo. Mine office: Llano, Magdalena, Sonora, Mex. Employs 40 men. Dr. C. L. V. Hedrick, president and general manager; Dr. F. A. Patterson, vice-president; M. Y. Loaiza, first vice-president; preceding officers, W. R. Braden, R. L. Davidson and W. W. McEntire, directors; Harry Haldeman, secretary and treasurer; I. E. Bowers, mine superintendent. Organized Apr. 11, 1905, under laws of Arizona, with capitalization $1,500,000, *shares $1 par; issued*, $1,400,000. Was registered

and protocolized, May 30, 1908, under laws of Mexico. Annual meeting, first Monday in June.

Lands, 10 groups, area 526 hectares, also 5,000 hectares miscellaneous ranch and timber lands, including mineral lands an Curacahui Mountain, circa 10 miles southeast of Llano. Lands show porphyry and limestone, carrying ore bodies, one, of 3′ to 50′ estimated width, traceable circa 3 miles, opened by sundry pits and prospect shafts of 8′ to 50′ depth and by shafts of 105′, 150′ and 500′, and tunnels of 50′, 200′ and 577′, estimated to show circa 100,000 tons of ore, including chalcocite, bornite and chalcopyrite assaying 5 to 11% copper, 6 to 10 oz. silver and $2 to $5 gold per ton.

Equipment includes a 105-h. p. steam plant, with 7x8″ and 8x10″ hoists. There are 24 mine buildings, including a store and dwellings, also a sawmill. Property is served by Sonora branch of the Southern Pacific railway, 4 miles distant.

Company plans continuous development and blocking out ore for stoping. Test shipments from upper levels indicate the possibility of making substantial shipments of ore of good average tenor, after reasonable selection. Property considered promising.

MINAS LLANOS BLANCOS y LOS PATOS. CHILE.

Mine office: Tamaya, Ovalle, Coquimbo, Chile. Mine, opened 1893, has a 250′ shaft. Idle several years.

"LLOYD" COPPER CO., LTD. AUSTRALIA.

Offices: 107 Pitt St., Sydney, N. S. W., Australia, and 195A Winchester House, London, E. C., Eng. Mine office: Burraga, Bathurst Co., N. S. W., Australia. Alex. Creighton Arthur, chairman; W. Soutar, colonial director; W. H. Corbould, general manager; H. A. McMahon, secretary; J. Sarran, colonial secretary.

Organized May 9, 1899, with capitalization £250,000, increased November, 1906, to £300,000, shares £1 par; issued, £280,000. Capitalization was increased £50,000 to extinguish an equal amount of 10% debentures. Company had a share interest in the Murrin Copper Co., Ltd., which proved a failure. Profits, 1907, were £32,419, from which a dividend of 1s., amounting to £14,000, was paid, March 2, 1907.

Lands, 380 acres freehold, and 385 acres leasehold, one mile from Burraga, in the Bathurst district, which is arid, and operations are suspended at uncomfortably frequent intervals, from lack of water, though the mine has an 85,000,000-gallon storage tank, holding 9 months' water supply.

The mine, opened 1877, is bottomed in badly disturbed ground. Ore is slightly argentiferous chalcopyrite, with quartz gangue, occurring in fissures traversing acid diorite. The main vein has an ore chute of about 700′ length, worked to depth of circa 750′. The vein ranges 3′ to 8′ width, with an average of about 5′. The ore is highly silicious, and gave average returns, 1907, of 2.36% copper. To the eastward is a fault, cutting off the eastern extension of the vein from the first to the fourteenth levels, but protracted search has shown a continuation of the vein, to the eastward of the fault, which has given a 300′ horizontal downthrow, the discovery of the eastern extension of the vein greatly improving the prospects of the property.

Equipment includes steam and electric power, with hoisting machinery and shops. Fuel is hardwood, about 75 choppers being worked when the property is in operation, as fuel requirements are about 60,000 cords yearly. Much trouble is experienced from shortage of fuel, and a 9-mile tram-line has been surveyed, for a wood line, but has not been built. Apparently the lack of this line, which would cost about £20,000, is responsible for a considerable part of the company's troubles.

The reduction plant, built 1901, at a cost of £32,000, was overhauled and

harged, 1906, and includes a concentrator and smelter. The works formerly ad 2 blast-furnaces, one of which was sold to the Murrin Copper Co., Ltd., hich was wound up at a heavy loss, so the furnace was practically lost, and he other blast-furnace was sold to the Great Cobar mine. Present equipment ncludes a 40-ton calcining furnace, 19x48' over all, treating 40-ton charges of natte, and a reverberatory furnace, 23x65' over all, hearth having inside width f 20', with grate area of 6x8', and 5 charging hoppers. The smelter is said o have a converter plant.

From the beginning of mining, 1880, to the end of 1906, the company smelted 323,071 long tons of ore, making therefrom 14,122 long tons of fine copper, largest production being 4,088,000 lbs., in 1902. Production, 1905, was 2,058,560 lbs., and in 1906 was 2,739,520 lbs. fine copper. About 500 men are employed normally.

LLUVIA DE COBRE MINING CO. **MEXICO.**

Office: 711 Kansas City Life Bldg., Kansas City, Mo. Mine office: Carbó, Ures, Sonora, Mex. A. H. Glasner, president; Edgar Hubbard, first vice president; W. M. Rynerson, second vice-president; Bruce Dodson, secretary; Wm. E. Jones, assistant secretary; E. J. White, treasurer; J. C. Worthington, general manager; Frank Smith, superintendent. Organized November, 1904, under laws of Arizona, with capitalization $3,000,000, shares $1 par, increased, 1907, to $5,000,000. Lands, 283 acres, on San Juan Mountain, in the Papago district, circa 30 miles west of Carbó, opened by the 410' Josephine shaft, showing auriferous and argentiferous copper sulphides assaying up to 33% copper, 560 oz. silver and $7 gold per ton. Has a 10-drill air-compressor and is said to plan building a small matting furnace. Advertising is decidedly lurid and the company is not regarded favorably.

LOBBS HOLE CENTRAL COPPER MINE. **AUSTRALIA.**

Mine office: Kiandra, N. S. W., Australia. Property shows 3 veins, of 3" to 14" width, opened by shaft to depth of circa 100', giving ore assaying about 30% in copper tenor.

LOBBS HOLE COPPER MINE, N. L. **AUSTRALIA.**

Office: care of Alexander Jobson, manager, Equitable Bldgs., Sydney, N. S. W., Australia. Mine office: Kiandra, N. S. W., Australia. P. W. Horton, chairman. Capitalization £60,000, shares £1 par. Lands, 120 acres, 45 miles from Tumut. Mine, to end of 1906, had produced about 2,000 tons of ore averaging 28% copper, with 2,000 tons of second-grade ore stocked at the mine, part of which since has been washed away by floods. Planned reopening mine and building a small smelter, during 1908.

LODI GOLD & COPPER CO. **NEVADA.**

Letter returned unclaimed from former mine office, Rhyolite, Nye Co., Nev. Lands are near Skull Valley, in the River Basin district, and a shaft was being sunk thereon, July, 1907. Idle and apparently moribund.

LOGAN & CO., LTD. **ENGLAND.**

Office and works: Birkenhead, Cheshire, Eng. Property is a copper smelter and refinery.

LOGAN COPPER CO. **ARIZONA.**

Mine office: Jerome, Yavapai Co., Ariz. W. J. Casey, superintendent. Lands, 11 claims, in the Copper Basin district, having a 157' two-compartment shaft, showing ore carrying about 3% copper and $1 gold per ton.

LOG CABIN GOLD & COPPER CO., LTD. **UTAH & ONTARIO.**

Dead. Formerly at Marysvale, Piute Co., Utah, and Mine Centre, Rainy River district, Ont. Merged, 1906, in Utah Gold Mountain Mining Co. Very fully described Vol. VI.

LOGOS MINES CO. **ARIZONA.**

Mine office: Mayer, Yavapai Co., Ariz. W. R. Ferguson, general man-

ager. Lands, in the Big Bug district, have a 60′ shaft, equipped with a 40-h hoist and 5-drill air-compressor.

NEGOCIACIÓN MINERA LOMA DEL TORO. MEXI

Mine office: Zimapán, Hidalgo, Mex. Property includes La Luz and Lo del Toro mines, carrying silver-lead and copper ores. Employed circa 75 m at last accounts.

LOMAGUNDA DEVELOPMENT CO., LTD. RHODESI

Office: 404 Salisbury House, London, E. C., Eng. John Secar, chairma H. Ewer Jones, consulting engineer; Geo. T. Frost, secretary; Rhodesia Exp ration & Development Co., Ltd., agent in Rhodesia. Organized June 18, 18 capitalization increased December, 1901, to £250,000, shares £1 par; issu £227,850. Paid a 10% dividend, January, 1906. Lands, 316 claims, in t Lomagunda district of Mashonaland, including the United Kingdom claim, which development, now under way, has shown a promising body of aurifero copper ore. Company also has extensive shareholdings in the Consolidat African Copper Trust, Ltd., Ayrshire Gold Mine & Lomagunda Railway C Ltd., and Rhodesian Banket Co., Ltd.

LOMA VERDE COPPER CO. ARIZON

Dead. Was a stock-jobbing swindle. Formerly at Tucson, Pima C Ariz. Fully described Vol. V.

LOMBARD COPPER CO. OREGO

Dead. Formerly at Baker City, Baker Co., Ore.

LOMBARD GOLD & COPPER MINING CO.

Dead. Formerly had an office at 316 McCornick Bldg., Salt Lake Cit Utah.

LONDON-ARIZONA COPPER CO. ARIZON

Office: 526 Security Bldg., Los Angeles, Cal. Mine office: Winkelma Pinal Co., Ariz. Chas. E. Finney, president; Frank L. Wright, vice-presiden John Mason Ross, secretary; E. W. Brooks, treasurer; preceding officers, Ch S. Gleed, B. L. Winchell and Hon. R. E. Sloan, directors; Edw. W. Brook consulting engineer.

Organized Apr. 12, 1907, under laws of Arizona, with capitalizati $10,000,000, shares $10 par. Debentures, $152,000, at 6%. Commercial Tru Co., Los Angeles, registrar and transfer agent Annual meeting, third Monda in January.

Lands, 1,257 acres, known as the Dripping Springs or O'Carroll group, London Mountain, in the Banner district, 7 miles north of Winkelman, th nearest railroad station, about 10 miles from Kelvin and 20 miles from Glob

Property shows limestone of the upper Carboniferous series, superimpose on quartzite, with frequent intrusions of porphyritic dykes, the limeston series having the same petrographical members as the Bisbee district, wit deposits occurring similarly as replacements in limestone. The basal quartzit caps a great monzonite laccolith, which presumably is the primary source the ore, and is said to carry copper values of about 2.5%, in disseminate chalcopyrite and chalcocite. The limestone shows an ore-bearing ledge abo 30′ wide, traceable circa 4,000′, to be developed by tunnel, carrying mainl carbonate ore, estimated to average circa 5% in copper tenor. The propert has about 2,000′ of workings, showing considerable carbonate ore of excellen grade, but estimates, in the press, of 3,000,000 tons of ore in sight, are con sidered excessive.

The company plans a 1,000-ton smelter, as the first unit of 3,000 to works, at a site on the Gila River, 2 miles north of Winkelman and about *miles from* the mine. The company advertised extensively, using many pag *advertisements* in the newspapers, but these were singularly free from exa

ns and false statements, it being the usual rule that the larger the sement, the further it is from the truth. Property considered promising.

ON-COLORADO PROPERTIES, LTD. **COLORADO.**

ne office: Central City, Gilpin Co., Colo. Property was a bond and n the Pierce mine, said to give a good showing of copper ore. Pre- y idle.

ON & GILA COPPER CO. **ARIZONA.**

ne office: Kelvin, Pinal Co., Ariz. Louis Melczer, vice-president; W. tchell, superintendent. Organized circa May, 1908, with capitalization 000. Lands, adjoining the London & Arizona, show low grade ores, ap- y in considerable quantities. Company is said to plan a concentrator.

ON & MEXICAN SMELTER & MINING CO. **MEXICO.**

ne office: Pánuco de Monclova, Coahuila, Mex. Company planned, erecting a modern smelter at Adjuntas station, about 15 miles from va.

ON MOUNTAIN COPPER CO. **ARIZONA.**

ice: Phoenix, Ariz. Mine office: Winkelman, Pinal Co., Ariz. Louis r, vice-president. Organized May, 1908, with capitalization $3,000,000. are near the London-Arizona Copper Co.

ON RANGE COPPER CO. **ARIZONA.**

ice: 526 Security Bldg., Los Angeles, Cal. Mine office: Winkelman, ., Ariz. Chas. E. Finney, president; Paul Burks, vice-president; E. J. ll, secretary; Edw. W. Brooks, treasurer; preceding officers and John ss, directors. Organized Dec. 28, 1907, under laws of Arizona, with ization $6,000,000, shares $10 par; issued, $2,000,000. Is controlled, h ownership of $1,940,250 of issued stock, by London Arizona Copper onds, $68,500 issued.

ON & RICHELIEU MINING & **BRITISH COLUMBIA.**
EVELOPMENT CO.

ne office: Rossland, Trail district, B. C. Capitalization, $1,200,000. ay advertised stock for sale, circa 1905, on the strength of its location e Granby, but apparently has no property in that neighborhood. Idle.

PINE COPPER MINING & REDUCTION CO. **COLORADO.**

ne office: Gray Rocks, Laramie Co., Wyo. Organized circa 1902, under f Colorado, with capitalization $1,300,000. Is said to have 250' shaft; ably idle.

PINE MINING CO. **ARIZONA.**

ad. Was a swindle. Was absorbed by Pan-American Mining & Smelting . Formerly at Prescott, Yavapai Co., Ariz.

STAR CONSOLIDATED COPPER CO. **ARIZONA.**

ice: Rogers Bldg., Boston, Mass. Mine office: Safford, Graham Co., Hon. Wm. H. Powers, president; Duncan McVichie, vice-president; H. Folsom, secretary; A. G. Smith, treasurer; S. S. Campbell, manager; C. B. Spalding, superintendent. Organized Aug. 6, 1906, under laws of Maine, with capitalization $5,000,000, shares $10 par, practically all of Maravilla Copper Co.

mpany controls the Mineral Mountain Copper Co., through ownership of o-thirds share interest, and controls, through majority ownership of stock, ase Creek Copper Co.

ds, 32 claims, including the Lone Star mine, in the Galiuro Mountains, miles north of Solomonville. The Lone Star mine is developed by a shaft owing a 5' vein of auriferous and argentiferous quartz, which is reported to be of 8 to 10% copper tenor, with fair gold values. The shaft also shows stringers of ore

LONE STAR COPPER CO. TEXA

Dead. Formerly at Henrietta, Clay Co., Texas. Described Vol. III.

LONE STAR MINING CO. ARIZON

Dead. Was succeeded by Maravilla Copper Co., also dead, which w succeeded by Lone Star Consolidated Copper Co. Formerly at Safford, Grah Co., Ariz.

LONG BEACH & ARIZONA MINING CO. ARIZON

Dead. Was succeeded, 1907, by Swastika Copper Co. Formerly at Jerom Yavapai Co., Ariz. Described Vol. VI.

LOOKOUT COPPER CO. ARIZONA

Mine office: Poland, Yavapai Co., Ariz. Lands are in the Slate Cre district. Has steam power. Presumably idle.

LOOKOUT MINING CO. ALASKA

Office: Cleveland, Ohio. Mine office: Niblack, Prince of Wales Islan Alaska. Arthur A. Wakefield, general manager. Property shows a mediu sized body of auriferous copper ore, and is equipped with steam power, em ploying 12 to 15 men.

LOON CREEK MINING & INVESTMENT CO. IDAHO

Office: Blackfoot, Idaho. Mine office: Ivers, Custer Co., Idaho. E. H Watson, president; J. M. Stevens, secretary. Lands, about 2 miles from th Lost Packer, have a tunnel showing auriferous copper ore.

LORDSBURG MINING & REDUCTION CO. NEW MEXICO

Mine office: Lordsburg, Grant Co., N. M. Thomas A. Lister, manage Organized April, 1906, with capitalization $600,000. Idle.

COMPAÑIA MINERA LORETA y PROVIDENCIA. MEXICO

Mine office: Jesus Maria, Ocampo, Rayón, Chihuahua, Mex. Owne by Jesus Poyval, Rascon Bros. and E. R. Bones, latter manager. Ores carr silver, copper and lead. Has a 500′ main shaft and a 900′ tunnel, with wate power, 5-stamp mill with 12 tons daily capacity and a one-ton smelter em ploying circa 75 men.

LORNITA MINING CO. MEXICO

Mine office: La Cananea, Arizpe, Sonora, Mex. Property is near th Puertecitos mines of the Greene-Cananea. Made a small ore shipment, Septem ber, 1908, to El Paso smelter.

LORRAINE COPPER MINING CO. WASHINGTON

Office: Hoquiam, Wash. Mine office: Keller, Ferry Co., Wash. Owe Jones, president; A. G. Rockwell, secretary; Fred J. Chamberlain, genera manager. Organized Apr. 13, 1900, under laws of Washington, with capitali zation $1,500,000, shares $1 par.

Lands, 22 claims, area 422 acres, in 2 groups, and a 20-acre millsite, Ferry and Pierce counties, Washington.

The Wilmot group, in the Sans Poil district, Ferry county, shows contac deposits between porphyry and schist, of 4′ to 6′ width, said to give averag assays of 6.5% copper, 40 oz. silver and $4 gold per ton, from malachite an azurite near surface, and from chalcocite, bornite and chalcopyrite at depth These figures are considered overestimates.

The Lorraine group, in the Carbon River district, shows 7 fissure veins i granite, giving assays up to 20% copper, 5 oz. silver and $1 gold per ton from bornite and chalcopyrite. The Lorraine group is opened by 4 shafts deepest 100′, and by 8 tunnels, 3 longest being 221′, 472′ and 630′. Properties as a whole have 2,016′ of workings. Idle several years, and apparently mor bund.

LOS ALAMOS MINING & MILLING CO. MEXICO

Office: 823 H. W. Hellman Bldg., Los Angeles, Cal. Letter returne *unclaimed from* former mine office, Alamos, Sonora, Mex. Dr. Finis E. Yo

and a $1,000 fine, while Arthur Levan, apparently at the head of the gan fined $100 and costs. Apparently it is very cheap to promote deli swindles through the United States mails. Formerly at Silver City, Co., N. M.

LOST GARNET GOLD & COPPER MINING & MILLING CO. WASHING

Dead. Formerly had offices at Seattle and Everett, Wash.

LOST GULCH COPPER CO. ARIZ

Letter returned unclaimed from former office, Los Angeles, Cal. office: Globe, Gila Co., Ariz. E. F. Kellner, manager. Has auriferous ores and a 10-stamp mill. Presumably idle.

LOST PACKER EXTENSION MINING CO. ID

Office: care of Col. O. P. Chisholm, secretary and treasurer, Boz Mont. Mine office: Ivers, Custer Co., Idaho. W. W. Chisholm, president.

LOST PACKER MINING CO. ID

Mine and works office: Ivers, Custer Co., Idaho. Jas. Ivers, pres J. T. Finlen, vice-president; Henry Welsh, secretary and treasurer; pre officers, J. Czizek and E. G. Rowe, directors; Patrick Sheehan, manager; Charles, superintendent. Capitalization is 150,000 shares.

Lands, 9 claims, in the Loon Creek district, circa 120 miles we Mackay. Mine is developed mainly by tunnel, No. 1 having a back of and No. 7 a back of 700′, while No. 9, now driving, will have a back of 2,000′. Tunnels are run on a vein of 2′ to 7′ average width, with max width of 12′ to 15′, carrying ore averaging 2 to 3% copper and $5 to $7 per ton, with a paystreak of 6″ to 5′ width, proven to average about 2′ distance of 500′ and depth of 400′, which carries sulphide ore returning 25% copper, 10 to 12 oz. silver and $40 to $75 gold per ton. Prope handicapped by inadequate transportation facilities, being 120 miles fr railroad, and deep snows preclude winter work.

The smelter has a 100-ton water-jacket blast-furnace, making matte aging 52% copper, 36 oz. silver and 13 oz. gold per ton, with slags ru only 0.2% copper. A converter is planned.

About 50 men are employed, when working, but the smelter is ope only a few months yearly. Production, 1907, secured from smelting oper July 26 to Oct. 31, is estimated at 425,000 lbs. fine copper, with large and silver values, and presumably was greater in 1908. The property i of exceptional promise.

LOST RIVER COPPER CO. ID

Letter returned unclaimed from former office, Anaconda, Mont. Pro in Lemhi county, Idaho, is said to show a 7′ vein of sulphide copper or tween quartzite and limestone. Idle and apparently moribund.

NUEVA SOCIEDAD COMPAÑIA DE LOTA i CORONEL. CH

Office: Valparaiso, Chile. Mine office: Carrizalillo, Chañaral, Ata Chile. Works offices: Lota, Concepción, Atacama, Chile, and Los Condes, tiago, Chile. Santiago Collins, manager. Organized under laws of Chile, capitalization 18,000,000 pesos.

Lands include the Mina Descubridora, at Carrizalillo, opened 1850, is about 650′ in depth; the Lota mine, opened 1856, and the Maitenes opened 1844, these carrying large bodies of ore, low in average copper and high in silica, which renders them difficult of reduction. Company owns coal mines, principal copper and coal mines having railroad connec with steam and electric power.

The Maitenes smelter, at Los Condes, is 45 kilometers from Santiag *nearest railroad* point, with a freight rate of 7 pesos per metric ton in *6 pesos out.* Works include a crusher plant and 3 reverberatory fur

of $60,000, at 6%, apparently not issued. Has been in financial strait about 2 years, and levied a 5-cent assessment September, 1907. Lan claims, patented, with extensive development, showing large bodies of grade ore, decreasing in values in lower workings. Main shaft, 1,20 planned to be deepened to 2,000'. Ores treated, 1902, average 3% co 52 oz. silver and 18 cents gold per ton. Production, 1907, was 235 car of ore. Suspended operations March, 1907.

LOYAL LEASE CO., LTD. BRITISH COLUM

Mine office: Van Anda, Texada Island, B. C. C. H. Jacobs, man Lands, 7 claims, area circa 350 acres, held under bond and lease from H Treat, owner, near Blubber Bay, 3 miles from Van Anda, showing out similar to those of the Marble Bay mine. Development is by a 300' s showing chalcopyrite and occasional bornite, of good average tenor. steam power and a 2-drill air-compressor.

GUSTAVO LOZANO. SALVAI

Mine office: Chalatenango, Salvador. Mines carry auriferous and ar tiferous copper ore, and have steam power. Employed circa 100 men, at accounts.

LUCERO COPPER MINING CO. NEW MEX

Dead. Formerly at Mora, Mora Co., N. M.

LUCILE DREYFUS MINING CO. WASHINGT

Mine office: Danville, Ferry Co., Wash. Theodore Petterson, superint ent. Mine has 3 tunnels, showing a ledge of 100' estimated width, with streak of circa 25', carrying argentiferous and cupriferous pyrite. Comp fell into financial straits, circa 1903, through fraudulent stock issued Eugene Cressley, the former secretary, who served a penitentiary term th for. Resumed work, 1907, after several years' idleness.

LUCILE GOLD & COPPER MINING CO. CALIFOR

Office: 226 San Bernardino Bldg., Los Angeles, Cal. Mine office: K San Bernardino Co., Cal. Geo. R. Barker, president; F. R. Pitney, vice-p dent; F. H. Gleason, secretary and treasurer; preceding officers, F. S. Ra and Dr. E. L. Pillsbury, directors. Organized Nov. 21, 1906, under law Arizona, with capitalization $1,000,000, shares $1 par. Lands, 3 claims, 60 acres. Development is by tunnels of 150' and 350'.

LUCIN COPPER MINES CO. UT

Mine office: Tecoma, Elko Co., Nev. Organized 1907, with capitaliza $1,500,000, shares $1 par. Lands, 28 claims, area 500 acres, 7 miles eas Tecoma, in the Lucin district of Box Elder county, Utah.

LUCKY BUTTE MINING CO. MONTA

Office and mine: care of S. W. Billings, Butte, Silver Bow Co., Mont. ganized 1907, under laws of Montana, with capitalization, $100,000.

LUCKY CALUMET COPPER MINING CO. IDA

Office: care of John H. Nordquist, vice-president and general mana Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. A. A. Bo president; H. P. Knight, secretary; Chas. Solberg, treasurer; preceding offic J. H. Hewand and O. O. Larsen, directors. Organized October, 1906, u laws of Idaho, with capitalization $1,500,000, shares $1 par.

Lands, 10 claims, patented, on Snow Storm Hill, between the Indepen and Snow Storm mines and about 1,500' from latter, supposedly carrying extension of the Snow Storm vein. Property shows 2 fissure veins, of 10 50' width, in quartzite, opened by ten 10' pits and by 3 tunnels, longest 1,100', latter cutting a vein of 30' to 40' width at a distance of 1,055' f portal, with back of 575', showing a vein of 30' to 40' width, carrying cup *malachite*, chalcopyrite and tetrahedrite, giving assays of 2.5 to 5% cop *with slight silver* values. Plans driving a new crosscut tunnel, from hea

entle Ann Gulch, to cut vein at circa 2,000'. Has electric power, air-compressor and 4 mine buildings.

LUCKY DAY MINING CO. **WASHINGTON.**

Dead. Formerly at Silverton, Snohomish Co., Wash.

LUCKY DUTCHMAN MINING & DEVELOPMENT CO. **NEVADA.**

Office: Salt Lake City, Utah. Mine office: Crescent, Lincoln Co., Nev. W. J. Snyder, president; John R. Royer, vice-president; preceding officers, B. O. Atkins, C. L. Anderson and R. S. Weimer, directors; H. B. Cole, secretary and treasurer. Organized 1905, with capitalization $125,000, shares 25 cents par. Lands, 4 claims. Idle.

LUCKY FRIDAY GOLD & COPPER MINING CO. **NEVADA.**

Office: care of J. T. Davis, secretary-treasurer, Carson, Nev. O. H. Gallup, president; S. L. Lee, vice-president. Organized Sept. 26, 1906, under laws of Nevada, with capitalization $1,000,000, shares $1 par. Lands, 5 claims, on Copper Mountain, in the Walker River district, Esmeralda county, Nevada. Has a 90' shaft, claimed to show ore averaging 28% copper.

LUCKY FRIDAY MINING CO. **IDAHO.**

Letter returned unclaimed from former mine office, Mullan, Shoshone Co., Idaho. Lands, 4 claims, adjoining the Hunter mine on the south, having a 625' crosscut tunnel cutting a 10' vein with a 4' paystreak giving assays up to 3.5% copper, 29% lead and 89 oz. silver per ton.

LUCKY GOLD & COPPER MINING CO. **ARIZONA.**

Office: 201-253 South Broadway, Los Angeles, Cal. Letter returned unclaimed from former mine office, Kelvin, Pinal Co., Ariz. J. D. Ferree, president. Lands, 16 claims, in the Riverside district, undeveloped but showing surface ores giving small assay values in copper, and about $7 gold per ton.

LUCKY STRIKE COPPER MINING CO. **WYOMING.**

Dead. Was succeeded by Lucky Strike Mining & Milling Co. Formerly at Lusk, Laramie Co., Wyo.

LUCKY STRIKE MINING & MILLING CO. **WYOMING.**

Office: Rawlins, Carbon Co., Wyo. Mine office: Lusk, Laramie Co., Wyo. Said to have been organized 1904, but company never filed articles of incorporation with the secretary of state of Wyoming. Is controlled, through stock ownership, by Copper Belt Mines Co. Lands, 6 claims, in the unorganized Buffalo Forks mining district, having a 251' crosscut tunnel, said to be in ore, with a surface showing of auriferous and argentiferous copper ore.

LUCKY VERDE COPPER CO. **ARIZONA.**

Dead. Lost lands, 1904. Formerly at Jerome, Yavapai Co., Ariz. Described Vol. III.

LUCY L. MINING & MILLING CO.

Office: 208-69 East Third South St., Salt Lake City, Utah. Mine at Callao, Juab Co., Utah. Frank L. Wilson, secretary and treasurer. Property in the Deep Creek district, shows ores carrying gold, silver, copper, lead, nickel and bismuth, and company claims to have developed ore carrying $160 gold per ton.

LUDWIG COPPER MINING CO.

Dead. Lands sold, 1907, to Nevada-Douglas Copper Co. Mine at Yerington, Lyon Co., Nev. Described Vol. VI.

KUPFERBERGWERK LUDWIGSDORF.

Mine office: Ludwigsdorf, Schlesien, Germany. Prussia.

LUKE CREEK GOLD-COPPER MINING CO.

Office: 435 Temple Court, Minneapolis, Minn. Letter returned unclaimed from former mine office, Marysville, Fort Steele division, B. C. S. D. Pumpelly, *president and general manager*.

Organized under laws of South Dakota with capitalization $1,000,000 $1 par. Lands, 2 claims. Idle several years and apparently moribund

BALDOMERO LUNA.

Office and mine: Chañaral, Atacama, Chile. M. Rojas, superin Property is the Mina Filomena, having steam power and employing men, at last accounts.

LUNA LEAD CO. NEW M

Office: 63 Centre St., New York, N. Y. Works office: Deming, L N. M. Robt. E. Powell, president and general manager. Has a smelter, treating mainly argentiferous lead ores, but also purchases and gold ores.

LUNING CONSOLIDATED COPPER MINING CO. NE

Dead. Formerly at Luning, Esmeralda Co., Nev.

LUNING COPPER CO. NE

Letter returned unclaimed from former mine office, Luning, Es Co., Nev. Lands, 9 claims, said to carry a large body of low grade o ing 10 to 20% in copper tenor, which seems a self-evident contradictio carry mainly copper, with considerable lead, both more or less aurifer argentiferous. Idle and apparently moribund.

LUNING COPPER MINING CO. NE

Dead. Property was near the Nevada Champion and Luning Co Formerly at Luning, Esmeralda Co., Nevada.

LUNING GOLD MINES SYNDICATE. NE

Letter returned unclaimed from former mine office, Luning, Es Co., Nev. A. L. Moore, superintendent. Lands, 5 claims one fraction 6 miles from Luning. Idle.

LUSTRE MINING CO. M

Dead. Succeeded January, 1906, by Lustre Mining & Smelting C merly at Santa Maria del Oro, El Oro, Durango, Mex.

LUSTRE MINING & SMELTING CO. M

Office: 1514 Park Bldg., Pittsburg, Pa. Mine office: Santa M Oro, El Oro, Durango, Mex. H. D. Gamble, president; J. H. Muell president; C H. Tebbetts, secretary; Wm. A. Pomeroy, general m Simon Lambert, mine superintendent; Frank B. Hine, smelter superin Organized January, 1906, under laws of Arizona, with capitalization $5 as successor of Lustre Mining Co.

Lands, 400 hectares, with 372 hectares in mill and smelter sit 19,300 hectares miscellaneous lands, including 6,000 acres of leasehe land. Property is the Magistral mine, opened by 3 tunnels and 9 shaft ing a large body of auriferous, argentiferous and slightly cupriferous with quartz and limestone gangue, carrying 0.5 to 5% copper, with an probably under 1% copper, circa 1 oz. silver and 15 to 20 grams g metric ton.

Equipment is very complete, including a central power plant w 360-h. p. Koerting gas engines and one 190-h. p. gas engine, with a 2,300-volt 3-phase generator, electric hoists, pumps and blowers. Th one 200-h. p. and three 400-h. p. gas producers. Mining machinery 10 hoists, of 100-h. p. to 300-h. p., and two 6-drill Ingersoll-Rand air-c sors.

The company owns 110 buildings, including a considerable nu dwellings, with a 60x110′ adobe carpenter shop and a 30x60′ smithy.

The stamp mill, which is idle, is 70x100′ in size, of wood, cover *galvanized iron*, and has 40 Colorado Iron Works gravity stamps.

The concentrator, also idle, is 60x100′ in size, of wood, covered w

nized iron. Equipment includes 2 Huntington mills, chlorination works and cyanide plant.

The smelter, operating on the semi-pyritic system, has 6 blast furnaces, including two 150-ton McDonald hot-blast furnaces and three 200-ton blast-furnaces, 42x126" at the tuyeres. Air for blast is heated by waste gases in a specially designed McDonald hot-blast heater. Fuel is West Virginia coke. The smelter is said to be putting about 15 tons of ore into one ton of matte, which is sold to the Aguascalientes smelter.

This company and its predecessors have operated for about 25 years, and through former poor management and trouble with refractory ores, accumulated an enormous debt. Experiments with chlorination and cyanide plants failed, but better results are being secured from semi-pyritic smelting. The company has displayed great persistence, and apparently has good prospects of reaching an assured footing.

LUTZ MINES CO. **ARIZONA.**

Office: care of Anton Lutz, Pittsburg, Pa. Mine office: Ft. Huachuca, Cochise Co., Ariz. C. R. Brinton, consulting engineer; A. L. Schultz, superintendent. Organized June 15, 1907, under laws of Arizona, with capitalization $100,000, shares $100 par. Lands, 7 claims, known as the Independence group, on the north fork of Ash Cañon, in the Hartford district of the Huachuca Mountains. Development is by tunnel, planned to be driven 1,200'. Has a 17-h. p. gasoline engine and 6-drill Ingersoll air-compressor.

LYELL BLOCKS CONSOLS MINING CO., N. L. **TASMANIA.**

Dead. Formerly at Mt. Lyell, Montagu Co., Tasmania.

LYELL-COMSTOCK CONSOLIDATED COPPER CO., LTD. **TASMANIA.**

Dead. Succeeded June 1, 1907, by Mount Lyell Comstock Copper Co., Ltd. Formerly at Mount Lyell, Montagu Co., Tasmania.

LYELL PIONEER CONSOLIDATED MINING CO., N. L. **TASMANIA.**

Office: 30 Queen St., Melbourne, Australia. Mine office: Mount Lyell, Montagu Co., Tasmania. C. E. Packer, manager. Capitalization £72,000, shares £1 par. Lands, 56 acres, leasehold, slightly prospected. Idle.

LYELL THARSIS MINING CO., N. L. **TASMANIA.**

Dead. Wound up circa 1906, and lease sold to Mt. Lyell Mining & Railway Co., Ltd. Formerly at Mt. Lyell, Montagu Co., Tasmania. Described Vol. V.

LYMNI COPPER MINING SYNDICATE, LTD. **CYPRUS.**

Office: 32 Great St. Helens, London, E. C., Eng. Mine office: Limassol, Cyprus. J. E. Lomas, chairman; A. C. Gibbons, secretary; Chas. Christian, mine manager; J. M. Ashworth, works manager. Organized March 12, 1897, under laws of Great Britain, with capitalization £23,500, shares £1 par, in 20,000 ordinary and 3,500 preferred shares; issued, £17,342.

Lands, 30 square miles, in the Bellathousa district of Colis, Chrysokhow, Cyprus. Ore occurs as lenses, largest claimed to be 400' wide and 1,400' long, which is something more than doubtful, claimed to carry bornite and chalcopyrite averaging 9 to 10% copper and 3 dwts. silver per long ton, which figures are ridiculous exaggerations. Ore formation apparently is continuous for 3 miles. Development is by 7 shafts, of 150' to 300' depth, and by a 2,100' tunnel. At last accounts mine was not permanently equipped, and development work was in progress, on a small scale.

LYNDHURST (SOUTH AUSTRALIA) COPPER CO., LTD. **SOUTH AUSTRALIA.**

Offices. 8 Broad Street Ave., London, E. C., Eng., and 75 King William St., Adelaide, South Australia. Mine office: Umberatana, Lyndhurst, South Australia. G. B. Elkington, *J. P., chairman; Arthur Hebden, secretary.* Organized Jan. 22, *1907, with capitalization £200,000, shares* £1 par; issued, £180,000.

Is controlled, through stock ownership, by Union Consolidated Copper Mines N. L. Lands, 180 acres, known as the Daly mine, at Umbratana, circa 7½ miles from Lyndhurst, the nearest railway point.

LYNDON MINES CO. NEVADA

Office: Los Angeles, Cal. Mine office: Pioche, Lincoln Co., Nev. E. F. Freudenthal, manager; C. M. Sampson, superintendent. Lands, 9 claims, in the Comet district, 9 miles west of Pioche, showing ore assaying up to 8% copper, 15% lead, 70 oz. silver and $5 to $50 gold per ton, with occasional sphalerite running up to 200 oz. silver and 1 oz. gold per ton.

LYNGENFJORD KOBBERVAERK. NORWAY

Owned by Norwegian-American Copper Mining & Smelting Co.

LYNN CREEK COPPER-GOLD CO., LTD. BRITISH COLUMBIA

Office: 419 Hastings St., Vancouver, B. C. Mine office: Lynn Creek, Vancouver Island, B. C. G. L. Allan, president and treasurer; W. H. Pegram, secretary; W. Thos. Newman, general manager. Organized 1901, under laws of British Columbia, with capitalization $300,000, shares $5 par.

Lands, 6 claims, area 200 acres, 8 miles from Vancouver, in the New Westminster district, showing 6 veins, of which 3, said to range from 5′ to 40′ in width, give assays up to 8.9% copper, 3 oz. silver and $1 gold per ton. Also has a 4′ to 6′ vein of zinc ore, opened by 2 tunnels, giving a back of 800′ to 1,000′. Mine is claimed to have a large amount of ore in sight, and could ship ore by water to various smelters. Idle some years.

LYONS KYLE GOLD MINING & MILLING CO. COLORADO

Mine office: Central City, Gilpin Co., Colo. Property is the Tucker mine, having auriferous and argentiferous lead and copper ores. Has steam power, 5-stamp mill and a 50-ton concentrator.

MAADEN-KENI MINES. TURKEY IN ASIA

Mine office: Baibourt, Trebizond, Turkey in Asia. Were operated, in a small way, by a Greek syndicate, circa 1904. Presumably idle.

MACBETH LEASING CO. IDAHO

Dead. Property, a lease on the White Knob mine, was sold, 1907, to the Empire Copper Co. Formerly at Mackay, Custer Co., Idaho.

MACGREGOR CLONCURRY COPPER MINES, LTD. AUSTRALIA

Offices: Palmerston House, London, E. C., Eng., and 395 Collins St., Melbourne, Australia. Mine office: Cloncurry, Beaconsfield Co., Queensland, Australia. Harvey Patterson, chairman; F. G. Hughes, Melbourne, secretary; E. Hebden, London secretary. Organized Dec. 19, 1906, under laws of Victoria, with capitalization £150,000, shares 10s. par; issued, £137,500. Lands include the Wee Macgregor group, area 55 acres, bought of the Leichhardt Cloncurry Co., Ltd., and the Wallaroo mine, having shafts, 240′ apart, said to show 28′ vein assaying 9% copper in No. 1 shaft, and a 40′ vein assaying 15% copper in No. 2 shaft.

MACK COPPER MINING CO. WYOMING

Mine office: Thermopolis, Frémont Co., Wyo. Organized 1908, with capitalization $1,000,000. Lands are at the head of Mud Creek, 18 miles from Thermopolis. A smelter shipment of one carload of gold and silver ores, made 1908, was said to have returned $43 per ton.

MACKEY-BURROUGHS MINING CO. COLORADO

Mine office: Central City, Gilpin Co., Colo. Has auriferous and argentiferous copper ore. Has steam power. Presumably idle.

MACKINAW COPPER CO. IDAHO

Mine office: care of E. Daft, manager, Hailey, Custer Co., Idaho. Lands, 3 claims, well timbered and watered, 25 miles east of Hailey and connected *herewith by a good* wagon-road, at the head of Lost River, in the Lost River *Mountains.* Mine has a 100′ shaft in a 3′ to 5′ vein between limestone and

showing chalcopyrite with quartz gangue assaying up to 15% cop-

AW MINING & MILLING CO. **WASHINGTON.**
office: Monte Cristo, Snohomish Co., Wash. Has ore giving fair
es in copper and nickel. Idle several years.

R SYNDICATE, LTD. **AUSTRALIA.**
: 8 Regent St., London, S. W., Eng. Mine office: Moonmera,
, Australia. T. D. C. Parker and R. W. McKay, permanent direc-
nized Jan. 13, 1906, under laws of Great Britain, with capitalization
res £1 par, to take over the Mount Morgan copper mines, area 200
esumably abortive.

-MEXICO MINING CO. **MEXICO.**
Madera, Cal. Mine office: Hostotipaquillo, Ahualulco, Jalisco,
H. Hunt, general manager. Organized circa 1904. Lands, 16 per-
showing auriferous copper ore.

MINING CO. **ARIZONA.**
612 Grant Bldg., Los Angeles, Cal. Mine office: Tucson, Pima
J. Hoffman, president; A. Erickson, vice-president; H. E. Brandt,
nd treasurer; preceding officers, W. P. Ascott, F. Gillelen, L. Lem-
T. E. Magee, directors. Organized November, 1907, under laws of
ith capitalization $1,000,000, shares $1 par.
, 16 claims, area circa 200 acres, south of Tucson, near Old Baldy
e Santa Rita Mountains, showing a 5' vein carrying auriferous and
s bornite and chalcopyrite, developed by a 100' tunnel.

HERMANOS. **MEXICO.**
Parras, Coahuila, Mex. Mine office: Santo Domingo, Iturbide,
, Mex. Own the Francisco Diaz mine, adjoining the Hathaway.
s Brothers are the principal owners and managers of the Compañia
a de Torreón, and are noted as among the most enterprising, capable
ally solid mine and smelter operators of the Republic.

IAN MINE. **MONTANA.**
care of Estate of Levi Z. Leiter, owner, Chicago, Ills. Mine office:
ilson Co., Mont. E. J. Trerise, superintendent. Ores carry gold,
copper. Has steam power, concentrator and 60-ton cyanide plant.
y idle.

D EXPLOTADORA DE MINAS DE MAGALLANES. **CHILE.**
and mine: Punta Arenas, Magallanes, Chile. Organized Oct. 20,
r laws of Chile, with capitalization £15,000, shares £1 par.

E MINING CO. **ARIZONA.**
office: Johnson, Cochise Co., Ariz. Has 2 shafts and shipped, 1907,
of carloads of 8% copper ore.

AGDALENA. **GERMANY.**
office: Mondorf, Rheinpreussen, Germany. Has sulphide lead and
and at last accounts was a trivial producer.

NA COPPER CO. **NEW MEXICO.**
31 First National Bank Blk., Colorado Springs, Colo. Mine office:
, Socorro Co., N. M. Jos. C. Colligan, president; Edwin Arkell,
; F. H. Dunnington, secretary and treasurer; E. E. Thomson,
; P. E. Johnson, mine superintendent. Organized March 7,
r laws of Arizona, with capitalization $2,500,000; shares $5 par.
claims, area 240 acres, showing granite, porphyry and limestone,
a 6' fissure vein, opened by 4 shafts, of circa 30' average depth,
ples are running 2 to 20% copper, 5 oz. silver and $2 gold per ton,
gangue. Also has zinc and lead sulphides.

MAGDALENA SMELTING & MINING CO. MEXI

Office: 208 Fifth Ave., New York, N. Y. Mine office: Magdalena, Tux pec, Oaxaca, Mex. Henry W. Catlin, president; Lloyd R. Hamer, vice-pre dent and manager; Marion DeKalb Smith, treasurer; Jas. L. Leeds, secretar John H. Williams, general manager. Organized August, 1907, under laws New York, with capitalization $5,000,000. Lands, 160 hectares, showing mai ly silver-lead carbonates. Reduction plant, known as the Magdalena, was t first modern smelter in the state of Oaxaca, blown in July, 1906, with dai capacity of 50 tons, which company planned increasing to 150 tons. In han of a receiver, August, 1908.

MAGDALENE MINE. NATA

Mine office: Undweni, Zululand, Natal. Lands, near the Vryheid borde show carbonate, silicate and sulphide ores, latter zinciferous, of high averag copper tenor, occurring irregularly, mainly as impregnations. Was under d velopment at last accounts.

MAGENTA GOLD MINING CO. COLORAD

Mine office: Granite, Chaffee Co., Colo. Has gold, silver and copper ore and steam power. Presumably idle.

MAGGIE MURPHY COPPER CO. WYOMIN

Office: 16 State St., Boston, Mass. Mine office: Douglas, Converse C Wyo. Hon. Chas. S. Ashley, president; John O'Neil, vice-president; A. Lee, secretary; Dr. F. M. Kennedy, treasurer; preceding officers, Geo. Hedge and Capt. Robt. A. Hammond, directors. Organized August, 1904, und laws of Wyoming, with capitalization $1,000,000, shares $1 par.

Lands, 12 claims, area 180 acres, also a 60-acre millsite, all fairly ti bered, on the northwestern side of Horseshoe Cañon, in the Laramie Pe district, showing country rock of granite, fissured with diorite, gneiss a schists, carrying 7 contact veins between gneiss and mica-schist, of which o under development, with a 114′ shaft, ranges 30′ to 60′ in width, carry covellite, bornite and chalcopyrite, associated with pyrrhotite, assaying 1 6% copper, 2 to 9 oz. silver and 40 cents to $4.50 gold per ton.

COMPAÑIA MINERA DEL MAGISTRAL. MEXI

Dead. Formerly at Santa Bárbara, Hidalgo, Chihuahua, Mex. Fully scribed Vol. VII.

NEGOCIACION MINERA DEL MAGISTRAL, S. A. MEXI

Office and mine: Apartado 22, Zacatecas, Mex. Dudley H. Norris, pr dent; Chas. O. Gilbert, manager. Mine has a small branch line, connect with Magistral Siding, on the Mexican Central Railway, near the city Zacatecas. Mine formerly turned out copper in the form of bluestone, magistral, for use in reducing the silver ores of Zacatecas. Has steam pow Smelter site is at Magistral Siding, and a concession was secured there 1907. Plant is planned to be of about 250 tons daily capacity, to treat cus ores, as well as ores from the Mina Magistral. Development and equipm are said to have been paid for out of earnings of the mine, which, 19 shipped about 100 tons of copper ore weekly. Employs circa 150 men. P duction, 1907, estimated at 500,000 lbs. fine copper.

MINAS MAGISTRAL y ANEXAS. MEXI

Owned by Las Moras Copper Mining Co.

MAGISTRAL COPPER MINES CO. MEXI

Dead. Formerly at Magistral, Chihuahua, Mex.

MAGISTRAL MINING CO. MEXI

Dead. Formerly at Ameca, Jalisco, Mex.

MAGISTRAL MINING SYNDICATE. MEXI

Dead. Was succeeded, 1907, by Los Angeles & Jalisco Mines Co. F merly at Etzatlan, Ahualulco, Jalisco, Mex.

MAGISTRAL SMELTING CO. MEXICO.

Mine and works office: Santa Barbara, Hidalgo, Chihuahua, Mex. John Shepherd, general manager; H. L. Snyder, smelter superintendent. Lands ...e leased from the Compañia Minera del Magistral, controlled by Governor ...rique C. Creel. Mine, 15 miles from Chihuahua y Pacifico railroad, having ...00' shaft, carries extensive contact deposits between limestone and porphyry ... low grade copper ore. Has steam and gasoline power. Is said to have a ...50-ton smelter. Mine must be worked on a large scale to be profitable, as ...e is low in tenor, though existing in large quantities.

MAGNETAWAN MINING CO. ONTARIO.

Dead. Formerly at Burks Falls, Parry Sound district, Ont.

MAGNOLIA GOLD & COPPER MINING CO.

Dead. Formerly had an office at Seattle, Wash.

MAGPIE GOLD & COPPER CO. WYOMING.

Office and mine: Encampment, Carbon Co., Wyo. *J. F. Merry, president;* ...E. Ferree, secretary; Chas. D. Terwilliger, treasurer. *Organized Oct. 6,* ...902, under laws of Wyoming, with capitalization $1,000,000, shares $1 par; ...ued, $650,850. Lands, 3 claims, *patented, area 60 acres, on the south* ...ork of the Encampment river, 5 miles from Encampment, *opened by a 200'* ...nnel showing medium grade chalcopyrite.

MAGUS MINING CO. WASHINGTON.

Office: 712-1241 G St., N. W., Washington, D. C. *Letter received as* ...dressed from former mine office, Silverton, Snohomish Co., Wash. *Algernon* ...Berg, president; Henry M. Kingsley, secretary. *Organized under laws of* ...Illinois, with capitalization $1,000,000, shares $1 par. *Lands, about 24 claims,* ...formerly owned by Forty-Five Consolidated Mining Co., in the Bolingbroke district, showing auriferous and argentiferous copper ores, with values mainly ...in the precious metals. Has a hydro-electric power plant and air compressor. ...Title for 3 years, until taken over June 1, 1905, by present company. *Output* ...only like since 1907.

MAHARAHARA COPPER CO. NEW ZEALAND.

Mine office: Waiuville, N. Z. Has a large ore body, under development, ...and sold small shipments, 1907, to Melbourne, for smelting.

MAINE & MONTANA COPPER CO. MONTANA.

Office: P. Haverhill, Me. Mine office: Butte, Silverbow Co., Mont. Mr. ...

COMPAÑIA MINERA DE MAIPO. CHILE.

Mine office: Cajon de Maipo, Victoria, Santiago, Chile. Works: Mina ...El Toro, Victoria, Santiago, Chile. Gregorio Cuevas, general manager. ...Property embraces El Toro, San Simon, Josefita and other mines, cop... ...over 2,500 meters of the strike of a strong vein, in metamorphic rocks in ...proximity with eruptive. The vein has a thickness of ore and gangue of ...3 meters width, with an average of about 2 meters, with strike of N. 20° E. ...and nearly vertical dip. The upper portion of the vein is strongly ferruginous ...for a distance, with a little limestone and quartz, carrying oxidized ores of ...lead, or less copper, by melaconite. The general average ... ...is stated as 4 to 5%. The ore is selected, with the object of ... ...that which is to be shipped for smelting purposes. Crushing ... ...and washing, using a Gates set of ...

The power plant at the mines has 1,000 h. p. and ... ...transmitted to Santiago at 50,000 volts, distributing ... ...and elsewhere. The mine has a Gates & Kirby ... ...although another of 3 compartments and three ... ...is being sunk, and there are ... ...the property, and other veins on other claims ... ...The mining plant includes a small ... ...The mines [illegible] ... ...

$9 per metric ton to the railroad, burns imported coke, costing 47 pe ton, with a little local wood. Equipment includes four 54" circular jacket blast-furnaces and two 36x72" quadrangular blast-furnaces, blowers. The converter department has 6 stands and a Vulcan air-com shells being 1.68x1.82 meters in size. Product is Chile bars, averaging in copper tenor. In 1903 the smelter employed 150 men, at average w 2 pesos daily.

Production, 1903, when this was the second largest copper prod Chile, was 17,997 metric tons of ore, averaging circa 7.9% copper, and 2,822,990 lbs. fine copper. Mining and smelting costs are low, and copper is said to cost only £30 per long ton, laid down in London, whic seems unduly low. The company employs circa 600 men, and is enter and vigorously managed.

JOAQUIN MAIZ y CA. M

Office and mine: Villa Aldama, Décimo, Nuevo León, Mex. C. manager. Property is the Blanca y Anexas mines, developed by tunn ducing copper ore with a force of about 50 men, at last accounts.

SOCIÉTÉ ANONYME DES MINES DE CUIVRE DE MAJDANPEK. S

Office: Brussels, Belgium. Mine office: Majdanpek, Servia. E 500 men. Emile Thorez, chairman; Emile Fromont, manager; Chas. B secretary; Leo Zenzes, manager; Alfred Müller, smelter superintendent Hermann, engineer. Organized 1903, under laws of Belgium and Servi capitalization 5,000,000 francs, shares 500 francs par.

Lands include mineral concessions covering 18,800 hectares, 1(from the Danube and circa 75 miles southeast of Belgrade, showing t and limestone carrying native copper, malachite, azurite and chalc commercial ores being almost exclusively sulphide, and mainly chalc with some chalcocite, bornite and covelite, associated with pyrite an sional magnetite, in a quartzose gangue, ores averaging about 3% cop oz. silver and 75 cents gold per ton. The property was worked on a scale, under former ownership, and was estimated, 1906, by the comp show 600,000 tons of ore, with 250,000 tons blocked out for stoping, figures seem high.

Transportation is furnished by a 10-mile Bleichert aerial tram fr mine to the Danube, and there is a half-mile Bleichert aerial tram t the mine and smelter.

The smelter formerly had three 40-ton Hereshoff water-jacket bl naces, and a 200-ton blast furnace was installed, 1907, to employ the E pyritic process of smelting. Product is blister copper, averaging cir copper, 14 oz. silver and 1.5 oz. gold per ton. The company is said to 250-ton leaching plant, for treating of low grade pyritic ores.

MAJESTIC COPPER CO.

Office: 1102-79 Milk St., Boston, Mass. Mine office: Milford, Bea Utah. E. E. Abercrombie, president. Organized June 18, 1904, under Maine, with capitalization $450,000, shares $10 par. In November, 190 talization was reduced to $400,000, shares $1 par, and increased to $ shares $1 par. Bonds, $1,000,000 authorized, $514,000 outstanding. C was organized as successor of Majestic Copper Mining & Smelting (the old corporation continues in existence, and the Majestic Copper C tically has been succeeded by the Majestic Mines Co. Fully described

MAJESTIC COPPER MINING & SMELTING CO.

Office: 1102-79 Milk St., Boston, Mass. Mine office: Milford, *Co., Utah.* To all practical intents and purposes was succeeded, 1 *Majestic* Copper Co., which was succeeded, 1908, by Majestic Mines

the Majestic Copper Mining & Smelting Co. remains in existence. The company became bankrupt, circa 1904, but eventually paid 100 cents on the dollar. Very fully described Vol. IV.

MAJESTIC MINES CO. **UTAH.**

Office: 1102-79 Milk St., Boston, Mass. Mine office: Milford, Beaver Co., Utah. W. D. Elwell, president; John M. Dick, vice-president; D. J. Flanders, secretary and treasurer; Alex J. Moffatt, manager. Organized May, 1908, with capitalization $5,000,000, shares $5 par, practically as successor of Majestic Copper Co. and Majestic Copper Mining & Smelting Co. On Oct. 1, 1908, owned circa 80% of the outstanding bond issue, $514,000, of the Majestic Copper Co. Stock of the new company was exchanged for bonds of the old company, on the basis of 900 shares of stock for each $1,000 bond, and holders of stock in the old company were given new stock, pari passu, on payment of an assessment of 15 cents per share. The floating indebtedness of the old company is said to have been paid off, and, by retiring the bonds, the present company is placed in better shape, financially, than any of its predecessors, which suffered from heavy loads of debt.

Lands, 120 claims, area 2,450 acres, also an 80-acre smelter site and 1,100 acres miscellaneous lands, in 8 groups, located in 5 districts of Beaver county, showing about 100 ore bodies, carrying copper, gold, silver, platinum, lead, cobalt, bismuth, vanadium and uranium. Copper ores include all of the principal oxides, carbonates and sulphides, also occasional native copper, and many of the rarer copper minerals, ores ranging from 2 to 85% in copper tenor, with estimated average values of 12% copper, 12 oz. silver and $3 gold per ton, with large percentages of lead, but these figures, made by the former management, are much too high. There are 18 shafts, of 100′ to 400′ depth, also many tunnels and innumerable test pits, with circa 6 miles of workings. Former management estimated 1,000,000 tons of ore in sight, with 500,000 tons blocked out for stoping, but these estimates were greatly exaggerated, and must have been known to be such when put forth, while stock was being fed to the public. Some of the properties were worked formerly for silver, but the silver-copper ores at and near surface gave way to copper-silver ores at depth, all ores being more or less auriferous.

The company has platted the townsite of Lewisville, where the smelter is located. The mines and smelter are served by the Oregon Short Line railroad.

The O. K. mine, 7 claims, is the principal property of the company, and is opened by a 3-compartment 400′ shaft, in a vein up to 20′ in width, with considerable development on the 300′ and 400′ levels. A smelter shipment, in 1, of 258 tons of ore, returned 40% copper, 7.5 oz. silver and $3.80 gold per ton. This mine has more or less ore blocked out, apparently in a stockwerk of a 250′ width, carrying stringers of high grade ore.

The Harrington-Hickory group, 25 claims, partly fractional, has two 400′ shafts, the main shaft having 3 compartments, with circa 40 pits and shallow cuts showing ore. The property shows numerous fissure veins, intersected by cross-veins, both approximately vertical, and in addition has a series of bedded veins, dipping at 30° to 35°, giving three separate intersecting systems of ore bodies. Values are mainly in lead, ores assaying 2 to 3% copper, 40 to 50% lead, up to 50 oz. silver and circa $1 gold per ton.

The Old Hickory group, 9 claims, has a gossan of 250′ estimated width, on a vein of 40′ to 200′ width, opened by circa 50 pits and shafts, deepest showing ores assaying 4 to 5% copper, with combined gold and silver values of $2 to $4 per ton.

The Vicksburg group, 4 claims, formerly worked for gold, has 3 practically vertical fissures, *of 2′ to 20′ width, with* mineralized cross-veins, opened

by numerous shallow pits and shafts, and a 2-compartment working shaft.

The Hoosier Boy group, 10 claims, has a 250′ vertical shaft in limestone carrying auriferous and argentiferous copper and lead ores.

The Larkspur group, 8 claims, has a 60′ contact deposit between granite and limestone, carrying irregular bunches of high-grade ore.

The Copperfield group, 17 claims, lies between the O. K. and Old Hickory mines, and is undeveloped.

The Apex group, 4 claims, adjoins the Old Hickory mine, and is practically without development.

The Ben Harrison group is undeveloped.

Equipment includes steam, gasoline and electric power, with a 34-h. p. Fairbanks & Morse hoist, Ingersoll-Sergeant air-compressor and Rand drills. There is an undeveloped water power on Beaver River, 35 miles distant, said to be capable of generating circa 2,000 h. p. and transmitting same electrically to the mine and smelter, at a cost of circa $100,000 for a hydro-electric installation and transmission line.

The reduction works, at Lewisville, 3 to 8 miles from the various mines, include a sampling mill and smelter. The smelter building, of steel frame, on stone foundations, has room for four 250-ton blast-furnaces, with necessary machinery, and has a 250-ton blast-furnace for copper and a 100-ton lead stack, with Nesmith hot-blast stoves, heating the air to 800° F. before entering the tuyeres. The smelter is small and already antiquated, though scarcely warmed, having run only 40 days, giving half the claimed duty, and smelting only about 5,000 tons of ore.

On a test-run, 1903, returns were 5.1% copper, 3.8 oz. silver and $1.20 gold per ton. Apparently the copper ore as a whole averages only about 2% in tenor, and is silicious. There are numerous bodies of high grade ore, but the property, as a whole, suffers from diffusion of wealth, there being numerous points at which small quantities of high grade ore are available, with a considerable tonnage of low grade ore partially developed. The company has been reconstructed repeatedly, and the mine has redeemed none of the exaggerated promises made for it. The present company, however, seems built more solidly than its predecessors, all of which were saddled with debts beyond their power to carry.

MAJOR EVANS CONSOLIDATED MINING & MILLING CO. UTAH.

Office and mine: American Fork, Utah Co., Utah. John J. Jones, president; Jos. J. Jackson, vice-president; F. A. Jackson, secretary and treasurer; preceding officers, F. J. Adams and Jas. H. Clark, directors. Organized circa January, 1908. Lands are in American Fork Cañon.

MAKU (NORTH CHARTERLAND) COPPER SYNDICATE, LTD. RHODESIA.

Office: 2 London Wall Bldgs., London, E. C., Eng. North Charterland Exploration Co., managers. Organized Jan. 13, 1906, with capitalization £5,000, shares £1 par, to acquire copper properties from the North Charterland Exploration Co., Ltd. Apparently moribund.

MALACHITE COPPER CO. ARIZONA.

Dead. Formerly at Williams, Coconino Co., Ariz.

MALACHITE COPPER CO. NEVADA.

Office: care of Willard F. Snyder, Salt Lake City, Utah. Mine office: Yerington, Lyon Co., Nev. Has a shaft, said to show a considerable body of sulphide ore of fair copper tenor.

MALACHITE COPPER-GOLD CO. CALIFORNIA.

Dead. Formerly at Daggett, San Bernardino Co., Cal. Described Vol. VII.

***MALDEN* MINING, MILLING & MANUFACTURING CO.** WASHINGTON.

Office: Rosalia, Wash. Mine office: Metaline, Stevens Co., Wash. D. D.

anager. Mine, opened by tunnel, is the only copper property in the her mines carrying lead ores. Equipment includes an air-compressor.

AD MALDINI DE COLLAHUASI. **CHILE.**

e: Iquique, Chile. Mine office: Collahuasi, Tarapacá, Chile. Organ- 8, 1905, under laws of Chile, with capitalization 160,000 pesos, shares par.

RD MINING CO. **ALASKA.**

r returned unclaimed from former mine office, Ketchikan, Alaska. n McLean's Arm, on the eastern side of Prince of Wales Island, to show a 20′ vein carrying chalcopyrite assaying 10% copper, 5 oz. d 0.14 oz. gold per ton, probably an overestimate all around.

EY-BLUE LEAD COPPER MINING **SOUTH DAKOTA.**
MELTING CO.

office: Sheridan, Pennington Co., S. D. John Harnan, president ral manager; Philip Harnan, vice-president and superintendent; J. G. secretary and treasurer. Organized 1899, with capitalization, va- ported, of $750,000 or $3,000,000, shares $1 par. Lands, 380 acres, a vein of 118′ claimed width, surmounted by a heavy gossan, carry- sional rich oxidized ores containing good copper and gold values. ent is by a 260′ shaft, showing occasional stringers of ore, and a nnel, showing some arsenopyrite. Developments to date have not pper in paying quantities, but payable ore is believed to exist below -level. Equipment includes a steam power plant and air-compressor.

MINE. **ALASKA.**

d by Brown-Alaska Copper Co.

ON COPPER SYNDICATE, LTD. **RUSSIA.**

: 74 Coleman St., London, E. C., Eng. Earl of Essex, chairman; F. , secretary. Organized May 10, 1907, under laws of Great Britain, talization £10,500, in 10,000 ordinary shares of £1 par and 10,000 pre- ares of 1s. par. Was organized to acquire copper properties in Rus- arently moribund.

TH COPPER CO.

. A swindle, perpetrated by the Wm. F. Wernse gang, of St. Louis.

TH COPPER MINE, LTD. **AUSTRALIA.**

: Hope St., Glasgow, Scotland. Mine office: Mungana, Chillagoe, d, Australia. R. K. Bell, John Millar, D. Gardner and J. S. Allan, Organized March 20, 1907, under laws of Great Britain, with capi- £10,000, shares £1 par.

TH COPPER MINING CO. **WYOMING.**

. Formerly at Saratoga, Carbon Co., Wyo.

TH COPPER MINING CO. OF MAINE. **CALIFORNIA.**

: 50 Congress St., Boston, Mass. Mine and works office: Kennett, ., Cal. Employs 1,000 men. Wm. C. Sharp, president; F. W. Bachel- tary and treasurer; A. S. Haskell, manager; Robt. E. Hanley, mine ndent; Jas. H. Kerwin, smelter superintendent; A. P. Anderson, en- Organized Aug. 2, 1904, under laws of Maine, and is controlled, through of entire stock issue, by the United States Smelting, Refining & o.

s, 14 claims, area 280 acres, also an 80-acre smelter-site, and miscel- nds giving total holdings of 1,400 acres, 3½ miles from Kennett, on ckbone Creek, in the Big Backbone district. Lands are well tim- th numerous mountain streams available for water supply, and the y is very rugged, mines being opened near the tops of the moun- nds *have been probed extensively* by diamond drill borings. A

$90,000 bond on the Friday-Lowden group was relinquished, 1907. The Ra snake mine is supposed to be held under bond. Property includes a bond lease on the Wood & Shelden claims, at Rainbow, on the headwaters of the ramento River, where development by tunnel is under way. Lands inclu considerable limestone deposit, used for fluxing.

The Quartz Hill mine, in the Old Diggings district, is held under a 5- bond and lease, dated 1906, with privilege of extension for 5 years furt subject to minimum extraction of 15,000 tons of ore yearly. Product of Quartz Hill is silicious fluxing ore exclusively, said to carry $6 to $8 gold ton, which probably is a considerable overestimate.

The Mammoth group is on the western side of the Sacramento Ri Country rock is mainly rhyolite, somewhat altered in places, with some sl and considerable porphyry, carrying long flat-lying lenses of ore that is mai slightly zinciferous chalcopyrite, disseminated in pyrite, both being aurifer and argentiferous, with an average of circa 3% copper, 2 oz. silver and cents gold per ton, with about 40% iron and up to 40% sulphur. Mine w said, August, 1908, to be yielding about 75 lbs. fine copper per ton. There a several ore bodies, the largest being 228′ wide and circa 500′ long, and the m has upwards of 2,000,000 tons of ore in sight, being opened considerably ahe of immediate requirements. Development is exclusively by tunnels, of wh there are 4, having ore bins at the portals. In August, 1907, the fourth tun was started, this being 18′ wide, with double tracks, having electric haula

Equipment includes a 40-drill air-compressor and two 15-drill Rand a compressors, with a 5-drill compressor at the Quartz Hill mines.

Buildings at the mine include a smithy, boarding-house and a hospi with accommodations for 20 patients. Water is piped to the mine and smel from the Mayflower claim.

Both mine and smelter are operated by electric power, secured from t Northern California Power Co., at a very reasonable rate, delivered to t power-house at a voltage of 2,000, the company requiring about 3,000 h. p. the operation of its mine and works.

An aerial tram of 13,200′ length, between the mines and smelter, is in t sections, the upper having a grade of 22% from the mine to the midway s tion, the upper section being operated by gravity, in counterbalance, a power generated by a retarding engine, which actuates an air-compres The lower section has sufficient grade for the loaded buckets to bring b empties. The tram line has a nominal capacity of 1,600 tons in 24 ho carrying 1,100-lb. buckets at intervals of 150′, with wooden supporting tow at intervals of 100′. In actual practice, the aerial tram proved to have ab 800 tons daily capacity only.

Owing to the inadequacy of the aerial tram, a 3,500-ton combinat ground-tram has been built, on somewhat novel lines, to meet peculiar l requirements. The ground tram includes 3 miles of standard-gauge railw from the smelter to the foot of the gravity road, the latter, 3,000′ long, c necting at the upper end with a 2-mile electric line leading to the mine. Th also is a 3-mile narrow-gauge railroad to the Quartz Hill mine, with 2 l motives.

The smelter, one-half mile from Kennett, 2½ miles southeast of the m and 2,200′ lower, occupies a site of 80 acres, and is the largest in Califor being of 1,800 tons daily capacity. The works, as built originally, at a c of $500,000, were of 1,000 tons capacity, but were greatly enlarged, 1907. buildings are of steel, all material is handled by gravity, and the plan operated on three 8-hour shifts. The works include a sampling mill.

The bin-house, of steel frame, for storage of ore, coke and limestone, *214′ long,* with capacity for 2,500 tons of custom ore and 100 tons of flux

copper tenor, this carrying considerable iron, which was valuable for fluxing purposes, but production is now blister copper, sent to the Atlantic seaboard for refining. The first furnace was blown in Oct. 6, 1905, and production, October, 1908, was circa 1,100 tons of smelting ore daily, which will be increased eventually to at least 1,500 tons daily. The property is valuable, and the equipment is adequate and efficient, while the management is thoroughly competent and is securing excellent results.

MAMMOTH COPPER & SMELTING CO. **ARIZONA.**

Dead. Lands taken over by Imperial Copper Co. Formerly at Red Rock, Pinal Co., Ariz. Described Vol. IV.

MAMMOTH GOLD MINING CO. **COLORADO.**

Office: 1104 Marquette Bldg., Chicago, Ills. Mine office: Central City, Gilpin Co., Colo. Ores carry gold, silver and copper. Has steam power. Presumably idle.

MAMMOTH LODES MINING CO. **BRITISH COLUMBIA.**

Office: care of H. O. Proebstel, Portland, Ore. Organized under laws of Oregon. Lands, known as the Colorado group, in the Cascade Mountains, Yale district, British Columbia, are claimed to show veins of 40′ to 250′ width, traceable for more than two miles, and it is claimed that smelting tests have given 15 to 20% copper and $12 gold per ton, these figures being, in themselves, ample evidence of their own untruthfulness, or of the unfair nature of the "test." Idle and apparently moribund.

MAMMOTH MINE. **ARIZONA.**

Owned by Calumet & Arizona Mining Co.

MAMMOTH MINING CO. **UTAH.**

Office: 41 Hooper Blk., Salt Lake City, Utah. Mine office: Mammoth, Juab Co., Utah. Samuel McIntire, president and general manager; Samuel McIntire, Jr., vice-president and superintendent; R. M. Wilkinson, secretary. Organized under laws of Utah, with capitalization $400,000, shares $1 par. Regular monthly dividend rate is 5 cents per share, or $20,000. Annual meeting, first Tuesday in February.

The mine, opened circa 1870, is extensively developed and has a 2,300′ main shaft, with good copper ore on the 2,200′ level. Mine carries auriferous and argentiferous lead and copper ores, principal values being in silver and lead.

The mill has 60 stamps. Production, 1907, was 477 carloads of ore. Litigation with Grand Central Mining Co. resulted in an adverse verdict for $149,812. Property is valuable and seems prudently managed.

MAMMOTH MINING & POWER CO. **MONTANA.**

Mine office: Mammoth, Madison Co., Mont. Allan C. Sanders, superintendent. Has auriferous copper ores. Equipment includes a 50-ton concentrator. Employed circa 20 men, at last accounts.

MAMMOTH TUNNEL & MINING CO. **COLORADO.**

Office: 403-331 Fourth Ave., Pittsburg, Pa. Mine office: Silverton, San Juan Co., Colo. A tunnel scheme, regarded with suspicion.

MANNASSAS-GAP COPPER-MINE, INC. **VIRGINIA.**

Dead. Succeeded, circa 1907, by Moqui Copper Co. Formerly at Reager, Rappahannock Co., Va. Fully described Vol. VII.

MANCAYAN COPPER SYNDICATE, LTD. **PHILIPPINES.**

Dead. Voluntarily wound up, August, 1902. Formerly in the Mancayan district, Island of Luzon, Philippines.

MANCHEGAN MINES, LTD. **SPAIN.**

Office: Clock House, Arundel St., Strand, London, W. C., Eng. Mine office *Fuencaliente*, Cuidad Real, Spain. H. Cossins, secretary. Organized Nov. 15

1905, under laws of Great Britain, with capitalization £5,000, shares £1 par; issued, £4,480. Property is the San Bartolomé III mine and sundry share interests.

MANCHESTER ZINC & COPPER CO., LTD.

Dead. Voluntarily liquidated, April 15, 1901.

"MAN" GROUP. **ARIZONA.**

Office and mine: care of Otto W. H. Schley, owner, Vail, Pima Co., Ariz. Lands, 4 claims, area 80 acres, in the Helvetia district, 9 miles southeast of Vail, formerly held by Bradford Development Co., showing Carboniferous limestone, intruded by porphyry dikes, latter considerably altered, with extensive outcrops of oxide and carbonate ores, succeeded at shallow depth by sulphides. Property shows several veins of 6" to 5' width, and has a 2-compartment shaft of 105', in porphyry, showing stringers of quartz carrying copper sulphides. Shipments of 100 tons, to El Paso smelter, gave returns of 9.5 to 17% copper, 8 to 16 oz. silver and $8.50 gold per ton. The ore carries an excess of iron, and smelts readily. Idle several years.

MANHATTAN CONSOLIDATED MINING & SMELTING CO. **WYOMING.**

Office: La Crosse, Wis. Letter returned unclaimed from former mine office, Encampment, Carbon Co., Wyo. Wm. Doerflinger, president; Chas. H. Freeman, vice-president; P. J. Bott, secretary; Herman Tillman, treasurer; F. L. Smith, superintendent. Organized Feb. 3, 1902, under laws of Wyoming, with capitalization $800,000, shares 10 cents par. Property has sundry pits and trenches, showing a vein of 4' to 12' width, giving ore assaying 3 to 30% copper.

MANHATTAN COPPER MINING CO. **ARIZONA.**

Dead. Merged, 1902, in Troy-Manhattan Copper Co. Formerly at Troy, Pinal Co., Ariz.

MANHATTAN COPPER MINING & MILLING CO. **NEVADA.**

Office: care of Hon. A. B. Lewis, president, 100 Broadway, New York, N. Y. Mine office: Pioche, Lincoln Co., Nev. E. F. Freudenthal, manager. Is controlled, through stock ownership, by the Nevada-Utah Mines & Smelters Corporation, and apparently succeeded the Manhattan Gold & Copper Mining Co. Lands, 2 groups, one east of Pioche and one in the Stampede Gap section. The Pioche group includes the Revenue, Telephone and Alps mines, with 100' and 140' shafts, showing ore assaying well in gold and silver. Stampede Gap property has auriferous and argentiferous copper and lead sulphides, opened by a shallow shaft and 2 tunnels, with circa 2,000' of underground workings.

MANHATTAN DEVELOPMENT CO. **ARIZONA.**

Office: Postoffice Blk., Houghton, Mich. Mine office: Paradise, Cochise Co., Ariz. J. H. Rice, president; W. G. Rice, secretary and treasurer; preceding officers, Thomas F. Cole, Nathan M. Kaufman, Samuel R. Kaufman, Allen F. Rees and Norman W. Haire, directors; Fred. W. Hoar, superintendent. Organized March, 1905, under laws of Arizona, with capitalization $200,000, shares $10 par; $5.50 paid in.

Lands, 37 claims, area 600 acres, fully paid for, in the California district, carrying upwards of 2 miles of the outcrop of a mineralized zone lying west and north of the holdings of the Chiracahua Development Co. Development is by several shallow shafts, deepest 80', and a 450' crosscut tunnel, latter showing leached ore and a little high-grade ore, with indications of permanent values at greater depth. Management is good, and property is considered promising. Idle, but resumption planned for 1909.

MANHATTAN ELY COPPER CO. **NEVADA.**

Office: 25 Broad St., New York, N. Y. Mine office: Ely, White Pine Co., Nev. Col. Luther Martin, president; Jos. H. Everett, vice-president; Willard B. Moore, secretary and treasurer; preceding officers, Jos. P. McQuaide,

Mortimer C. Mack, F. S. Pheby and J. Arthur Keagy, directors. Organi
1907, under laws of Arizona, with capitalization $5,000,000, shares $5 p
Lands, 10 claims, area 200 acres, in the western portion of the camp, not
from claims of the Giroux Consolidated.

MANHATTAN GOLD & COPPER MINING CO. NEVA

Dead. Lands sold, June 10, 1907, to Nevada-Utah Mines & Smelters C
poration. Formerly at Pioche, Lincoln Co., Nev.

MANHATTAN MINE. MAI

Letters returned unclaimed from former office, care of J. S. Moore &
owners, Portland, Me., and from former mine office, West Brookville, Hanc
Co., Me. Property included the Manhattan and Tapley mines, showing
assaying about 5% copper, which were reopened, 1907, after many years
idleness.

MANHATTAN MINING CO. IDA

Letter returned unclaimed from former office, Oakesdale, Wash. M
office: Saltese, Missoula Co., Mont. J. E. Bailey, president; O. H. Linn, su
intendent. Lands, 10 claims, shortly northwest of the Monitor mine, on
Idaho side of the divide of the Bitter Root Mountains, opened by a 350' t
nel, showing a 7' vein assaying up to 12% copper and $8 gold per ton.

MANICA COPPER DEVELOPMENT CO., LTD. PORTUGUESE EAST AFRI

Office: Finsbury Pavement House, London, E. C., Eng. Mine offi
Sierra Isataca, Macequece, Mozambique, Portuguese East Africa. W. E. La
secretary; W. M. Cairncross, mine manager. Organized May 26, 1902, un
laws of Great Britain, with capitalization £150,000, shares £1 par; issu
£115,110. Debentures, £10,000, at 6%.

Lands, 411 claims, area circa 900 acres, in the Sierra Isataca, midway
tween Macequece and Umtali, Rhodesia, lying 8 miles northeast of Umt
near the Edmundian mine, but in Portuguese territory. Three copper outcr
have been located, one of which is a vein of about 4' width, opened by a sh
which, on the 300' level, shows 3 distinct veins of copper ore with cal
gangue. Ore reserves are estimated at 12,000 long tons, of 7% average cop
tenor. Lower levels also carry galena and gold ore, there being a narrow p
streak of latter assaying up to 391 oz. gold per long ton. Planned, early 19
installing a complete machinery plant, including a 20-ton mill and a hyd
electric power installation on the Zambesi River, 3 miles from mine.

MANICA COPPER EXTENSION, LTD. PORTUGUESE EAST AFRI

Dead. Registered, 1903, with capitalization £1,000. Formerly at Sie
Isataca, Macequece, Mozambique, Portuguese East Africa.

MANICA EXPLORERS, LTD. PORTUGUESE EAST AFRI

Offices: 615 Salisbury House, London, E. C., Eng. C. Hartridge, ch
man; J. W. Youd, secretary. Organized Jan. 23, 1896, as reconstruction
Western Explorers, Ltd., and reorganized Dec. 3, 1904, under laws of Guern
with capitalization £100,000, shares £1 par; issued, £55,893. Lands include
copper claims, 770 gold claims, 16 acres of townsite lands and circa 25,
acres of miscellaneous lands, said to be rubber-bearing. Idle.

MANILLA MINING CO. ARIZO

Office: care of N. L. Houston, manager, Peoria, Ills. Mine office:
Huachuca, Cochise Co., Ariz. Lands are sundry claims in the Huachuca Mo
tains, opened by a 220' shaft, showing argentiferous copper and lead sulphi
Has a steam plant, with hoist, pump and air-compressor. Idle.

MANITOU MINING CO. MICHIG

Office: 12 Ashburton Place, Boston, Mass. Operating office: Calu
Mich. Mine office: Delaware Mine, Keweenaw Co., Mich. Quincy A. Sh
Jr., president; Rodolphe Agassiz, vice-president; preceding officers, Alexa

Agassiz and Francis L. Higginson, directors; Jas. MacNaughton, general manager; Geo. A. Flagg, secretary and treasurer. Organized June 26, 1905, under laws of Michigan, with capitalization $500,000, shares $25 par. Fiscal year ending April 30, 1908, showed a debit balance of $194,971.

Lands, 38,693 acres, including the Delaware, Eagle River, Eagle Harbor, Montreal and New Jersey mines, all early-day mines of Keweenaw county.

The old Delaware mine, now known as the Manitou, and formerly known as the Conglomerate and Lac La Belle, has circa 3,700 acres of mineral lands and upwards of 17,000 acres of miscellaneous lands, with a water frontage of 10 miles on Lake Superior, and the entire frontage on Lac La Belle. This property sunk, under various ownerships, circa $3,700,000, before passing to the present company, and the old mine is exhaustively described in Vol. II. The old Delaware mine, opened on the Allouez conglomerate, has 4 shafts, of 300′ to 900′ depth, the Allouez bed underlying the greenstone, and dipping northward at an angle of 25° 30′. The old Delaware workings were unwatered, and found to give a fair showing of copper, and copper was found in the Meadow amygdaloid, underlying the conglomerate.

The Delaware tract was tested by diamond drill borings, and on an amygdaloidal bed, identified as the Kearsarge lode, 3 pits, deepest 65′, were sunk, giving a fair showing of copper. The Kearsarge bed is 7,800′ southward from the base of the greenstone.

Principal development of the Manitou is on an amygdaloidal bed, known as the Montreal River lode, lying 770′ south of the base of the greenstone bluff. The Montreal River bed dips at about 28° and is 12′ to 14′ in width, showing considerable copper, but work was suspended, 1907, as results were not satisfactory.

MANITOU MINING & MILLING CO. **COLORADO.**

Dead. Formerly at Bonanza, Saguache Co., Colo.

MANSFELD'SCHE KUPFERSCHIEFERBAUENDE GEWERKSCHAFT. **GERMANY.**

Mine office: Eisleben, Prussian Saxony, Germany. Dr. Ferdinand Zirkel, Dr. Dittrich and Dr. Paul Wachler, executive committee; Bergrat Dr. Vogelsang, chief mine and smelter manager; Herman Schrader, smelter superintendent. Organized 1852, as a consolidation of numerous independent operators, and reorganized, April 10, 1876, with 69,120 shares. Employs circa 23,000 men, of whom 10% are at the smelter and 90% at the mines.

The Mansfeld mine was opened A. D. 1199, and under the Counts of Mansfeld attained a high state of development, and was immensely profitable, during the Fourteenth and Fifteenth Centuries, but the industry nearly suffered extinction during the Thirty Years' War. Activity was resumed in 1671, when the right of working the mines was declared free, this resulting in the building up of a great number of small independent operators. The present company was first formed, in 1852, as a consolidation of the various small mine operators and smelters, and the merging of many small interests has resulted in a nearly tenfold increase of production, from 2,660 metric tons in 1867.

The principal ore is slightly argentiferous chalcopyrite, associated with limited quantities of nickel and cobalt ores, occurring as speiss, disseminated in very fine grains through the kupferschiefer, a fine-grained bituminous shale. The kupferschiefer lies nearly horizontally, with a dip of 5° only, and is from 1′ to 3′ only in thickness, but covers nearly 200 square miles. Lying just below the kupferschiefer is an arenaceous shale, carrying chalcopyrite, and a limited quantity of copper carbonates. Owing to the thinness of the bed, and the great age and extent of the workings, it is necessary for miners to work on their sides, bellies or backs, as in coal mines, wearing boards upon their trunks and thighs, in order protect themselves from the rock floors. Owing to the

great age and extent of the workings, the headings usually are 2 to 4 kilo
ters from the shafts, hence the actual mining is done under considerable
advantages. The workings are of vast extent, and there are scores of old
abandoned shafts. Present mining operations are through 9 hoisting sha
with a large number of shafts for water and ventilation. Among the
shafts are the Johannes, at Hohenthal, and the Hermann, at Helbra.

Equipment is very complete, including hoists and general mining mac
ery, and 6 duplex Weisse & Monski pumps. The company maintains i
pendent machine shops, capable of repairing or building any mining or pu
ing machinery in use.

The Mansfeld has numerous reduction works, including 4 smelters for
ores, 2 roasting smelters with acid plants, 2 matte smelting works, 2 refi
furnaces, and one electrolytic refinery with desilverizing plant. The var
works have a total of 20 reverberatory furnaces. The principal smelters
the Krughütte, at Eisleben, with 4 furnaces; the Kochhütte, at Helbra,
4 furnaces; the Eckardthütte, at Leimbach, with 4 furnaces, and the Ku
kammerhütte, at Hettstedt, with 3 furnaces. All of these furnaces are of
cular shaft type, with forehearths, and use cold blasts, except the Kupferh
merhütte, where hot blast is employed to some extent. The Saigerhütte
refining plant, and the Gottesbelohnunghütte has 10 reverberatory furn
The Eckhardthütte has one lead stack, producing a silver-lead matte, and
ing a little nickel speiss from resmelted flue-dust. The Eckhardthütte ha
kilns and 5 lead acid chambers, and the Kupferkammerhütte has 82 kilns
6 lead acid chambers, these works making 2,212 metric tons of 50° Bea
sulphuric acid, in 1903, from the fumes of the ore and matte treated.

The method of reduction is by heap-roasting and calcining in shaft-
naces. Roast-heaps are built about 60 meters long, 5.5 meters broad at
bottom and 3 meters broad at the top, and only about 1.50 to 1.75 meters h
The only fuel used is a little brushwood, at the edges and bottoms of he
and each heap is roasted 4 to 6 weeks. If the ore, as produced, carries
fines, these are screened, briquetted and added to the roast-heaps. The ro
ing reduces the ore 8 to 20% in weight, and the roasting is more for the e
ination of carbon dioxide and bituminous matter than to throw off sulp
the latter running only 2 to 5% in the raw ore, while the bituminous ma
ranges 10 to 17%, and carbon dioxide 7 to 13%. There are 4 roast-stalls
the shafts, and at the furnaces the first-fusion product is a matte carrying
40% copper and 0.25% silver. This matte is broken up and roasted in 2
cining kilns, and the roasted matte, with the addition of 5 to 10% raw m
is smelted, in reverberatory furnaces, to white metal carrying 74 to 75% co
and 0.45 to 0.50% silver. The slags from the white metal carry 9 to
copper, and are returned to the shaft-furnaces. Slag is utilized extensively
the manufacture of slag-brick and paving blocks.

The Krughütte, near the mine, is equipped with Steinbeck circular
tiple-hearth automatic pyritic calciners, which use no carbonaceous fuel,
cept for preliminary charges. The Krughütte utilizes waste gases from
copper furnaces, for direct consumption in gas engines, the volume of
amounting to about 21,000 cubic meters per hour, giving an available maxi
efficiency of circa 4,400 h. p., with a mean of 2,700 h. p. The furnaces
connected with two gas mains, of 40" and 62" diameter, and gas is freed
dust by passing through counter-current washers, having spiral blades rota
at a peripheral velocity of about 165' per second, gas being brought into
mate contact with the water, which is separated by the action of the bl
and turned in the opposite direction to the flow of gas. After washing,
gas contains only 0.003 grams of dust per cubic meter, against 17 grams i
original condition, and is led to a gasometer storing 18,000 cubic feet, wh

it passes to the engines, of which there are two, of 1,300 h. p. each, with a third of similar capacity under erection.

The desilverizing plant, at the Saigerhütte, operates on the Ziervogel method, roasting the matte and retaining the silver as a sulphate, which is dissolved in water and the solution run over metallic copper, which precipitates the silver, the cement silver so secured being pressed and resmelted to metal .999 fine. The final furnace product, after the extraction of the silver, is a blister copper of 99.7 to 99.8% copper tenor. In 1903 the Mansfeld smelters treated 686,354 metric tons of ore, making therefrom 49,179 tons of low-grade matte, the average tenor of the ore being 28.19 kgs. copper and 0.156 kgs. silver per ton.

The electrolytic refinery has about 5 metric tons daily capacity, with electrodes arranged on the multiple plan.

In addition to its mines and smelters, the Mansfeld company has extensive industrial undertakings of a collateral and subsidiary nature, the more important being extensive coal mines and coke works at Hamm, Westphalia, also alkali deposits and works.

Production, which was only 5,865,898 lbs. in 1867, increased to 15,230,287 lbs. in 1877, 29,176,000 lbs. in 1887, and 40,230,400 lbs. in 1897. Production for the past few years has been as follows: 42,500,278 lbs. in 1903, 41,629,349 lbs. in 1904, 43,824,141 lbs. in 1905, 40,108,000 lbs. in 1906, and 38,822,000 lbs. in 1907. The property is handled with great technical skill, and its ore bodies, by reason of their vast area, are among the largest known to man.

MANSFIELD MINING & SMELTING CO. **ARIZONA.**

Office: 812 Grand Ave., Kansas City, Mo. Mine office: Patagonia, Santa Cruz Co., Ariz. Employs 15 men. Roland E. Bruner, president; Hon. M. A. Fyke, vice-president; Arthur C. Sweet, secretary and treasurer; A. B. Richmond, general manager; preceding officers and Prof. Jean Robert Moechel, directors. Organized May 29, 1906, under laws of Arizona, with capitalization $8,000,000, shares $1 par; issued, $4,578,110, on Aug. 16, 1908. On same date company had, cash on hand, $1,800, with $44,000 due on deferred stock payments, and was without accrued liabilities. Annual meeting, second Monday in January. Company is said to have authorized a $100,000 bond issue, at 6%, with circa $20,000 issued, but reported, Aug. 15, 1908, no bonds outstanding.

Lands, 17 claims, unpatented, area 340 acres, also a 10-acre millsite, in the Wrightson district, 8 miles from the Sonora branch of the Southern Pacific railway, showing syenite, porphyry, dacite and rhyolite, carrying veins of 4′ to 30′ claimed width, said to be increasing in width and richness with depth. Ore is auriferous and argentiferous copper sulphides, and company claims that the average of numerous samples is 15% copper and 40 oz. silver, which would indicate that the property either lacks considerable ore bodies developed, or that the samples were taken more with a view to good assays than to exact averages.

Development is by the Fraction tunnel, on a vein claimed by the company to be 200′ wide, and by the Sweet shaft, 360′ deep, said to have ore opened on 2 levels, and the Black Cap shaft, showing some high-grade gold and copper ore, which apparently is limited in quantity. The mine was reported, May, 1907, to have 1,340′ of workings, and was claimed, October, 1908, to have nearly one mile of workings.

Equipment includes various mine buildings and a store, with hoists at the two shafts.

The smelter, planned to have blown in June 15, 1908, was completed circa September, 1908, and is said to have cost $21,900. The smelter has a 30-ton matting furnace, and is *considered thoroughly* impracticable, by reason of its small *size, and is a rather ridiculous installation* to be made by a company wi

$8,000,000 capitalization. A little ore was shipped, 1907, to El Paso sme and is said to have given good returns. The Black Cap shaft is claime have enough ore to feed the present smelter, which would not be hard. day's tonnage at the Anaconda works would run the Mansfield smelter more than a year.

The company's advertisements and prospectus were very misleading. T prospectus states that 50% of those engaged in the copper industry succee which is absolutely untrue. Maps and drawings in page advertisements c the company showed shafts and ore that were purely imaginary, when the com pany had nothing but prospect holes, and the company promised dividends i its advertisements, which promise was absolutely indefensible. The press, c that portion of it that is available, has been filled with trivial news items r garding the company and its property. The management complains that forme officials unloaded stock, to the detriment of the company. Mr. Richmond a parently has wasted no money in development, and is considered personall honest and competent, but the capitalization is excessive, development inad quate, and the company is regarded most unfavorably.

MINO MANTO VERDE. CHIL

Mine office: Tierra Amarilla, Copiapó, Atacama, Chile.

MAORILAND COPPER CO., LTD. NEW ZEALAN

Office: Christchurch, New Zealand. Mine office: Nelson, New Zealan W. J. McMurtrie, manager; Edwin Bray, mine manager; Harley E. Coope smelter superintendent. Lands, 2,000 acres, including several different mine carrying considerable native copper and rich secondary ores, connecting b good wagon road with the port of Nelson. Principal properties are the Unite Champion, which has 2 separate mines, carrying mainly chalcopyrite, opene by a 250′ shaft and various tunnels, showing a vein up to 14′ in width, car 1908 having 14,603′ of workings. The Monster mine, developed open-cu shows auriferous chalcopyrite, giving average assays of 17% copper and dwts. 17 grains gold per long ton. The Mount Claude mine, opened by tunnel shows a vein of about 4′ width, carrying oxidized ores with a gossan up to 25 width, said to give average assays of 5% copper and 3.8 dwts. gold per lon ton. The Doctor mine shows considerable chalcocite, and some native copper in a vein up to 11′ in width. Sample ore shipments, 1907, to Australia, fro the United Champion mine, gave returns of 13% copper. A smelter, built 1908 is connected with the mines by a tramway.

MINA DE MARACÁS. BRAZIL

Office and mine: care of Col. Pedro Gonçalves, owner, Maracás, Bahia, Brazil

TOMÁS MARAMBIO. CHILE

Office: Peña Blanca, Freirina, Atacama, Chile. Works office: Labra Freirina, Atacama, Chile. Property includes a number of mines and a reduc tion plant. The Santa Rosa mine, at Fragüita, 8 leagues from Peña Blanca, h 220 meters deep, with a vertical extension of 500 meters, opening a vein of 6 to 7′ average width, having north and south strike, with dip of 45°, and pro duced, 1903, circa 400 metric tons of 20% copper ore. The Mina Verde, nea the Santa Rosa, opened to depth of 130 meters, in 1903 produced 150 metri tons of 18% copper ore. The Mina Pequeña, 4 leagues from Peña Blanca, h opened to depth of 50 meters, with an oxidized zone of 30 meters, and in 190 produced 200 metric tons of ore of 20% copper tenor. La Mina Serena, opene to depth of 70 meters, with horizontal length of 160 meters, in 1903 produce 200 metric tons of 20% copper ore. El Manto mine, opened to depth of 12 meters, with an outcrop traceable 500 meters, in 1903 produced 20 metric ton of 20% ore. La Mina Maria Luisa, 140 meters deep, in 1903 produced 12 metric tons of 20% ore.

A smelter, 4 leagues from Peña Blanca and 18 kilometers from a railroa

everberatory furnaces turning out Chile bars of 50% average copper tenor. is Australian coal, costing 30 pesos per metric ton, delivered. One ton of is required to smelt 1½ tons of ore, slags running 0.7 to 0.8% copper. er employs circa 60 men, at average wages of 2 pesos daily. Production, was 4,450 metric tons of ore smelted, averaging 14.6% copper, making 26 lbs. fine copper.

VILLA COPPER CO. **ARIZONA.**
ad. Formerly at Safford, Graham Co., Ariz. Described Vol. VI.

LE BAY MINING CO. **BRITISH COLUMBIA.**
ad. Mine sold to the Tacoma Co. Formerly at Van Anda, Texada B. C.

ONELLE y HANZA. **PERÚ.**
ice and mine: Morococha, Junín, Perú. Lands, 2 pertenencias, on mining was begun 1902. Production, 1904, with average force of 25 as 97,355 lbs. fine copper, from ore averaging 12% copper tenor.

JS D. COPPER MINING CO.
ad. West Virginia charter forfeited, 1902.

ÑIA MINERA MARIA DE COLLAHUASI. **CHILE.**
ce: Iquique, Chile. Mine office: Collahuasi, Tarapacá, Chile. Organ- arch 29, 1905, under laws of Chile, with capitalization 120,000 pesos, 100 pesos par.

ÑIA MINERA LAS MARIAS DE COLLAHUASI. **CHILE.**
ce: Iquique, Chile. Mine office: Collahuasi, Tarapacá, Chile. Organ- arch 26, 1906, under laws of Chile, with capitalization £150,000, shares

OPA COPPER CO. **ARIZONA.**
d. Formerly had an office at 219 North Fourth St., St. Louis, Mo.

OPA COPPER MINES CO. **ARIZONA.**
d. Formerly at Wickenburg, Maricopa Co., Ariz.

MINING CO. **IDAHO.**
ter returned unclaimed from former office, care of R. B. Howard, presi- Wallace, Idaho. Mine office: Osburn, Shoshone Co., Idaho. Walter uperintendent. Lands, in McFarren Gulch, about one mile south of adjoining the Gray, show 2 veins, one carrying outcrops of high-grade erous galena, the other showing outcrops of argentiferous copper ore. oping by tunnel, and September, 1907, planned driving a lower tunnel, 100', starting same on property of the Black Traveler Mining Co.

TTA GOLD MINING CO. **IDAHO & WASHINGTON.**
ce: care of Lawson Investment Co., 60 State St., Boston, Mass. Mine Mullan, Shoshone Co., Idaho. M. E. Lawson, president and general r; H. C. Lawson, secretary. Organized under laws of Washington, with cation $1,000,000, shares $1 par. Lands include gold claims in Ferry Washington, and the Atlas group of 5 claims, area 100 acres, in the Peak district of the Cœur d'Alenes, Idaho. Development is by a 250' claimed to show a 20' ore body, averaging $50 per ton in copper, gold er values, which is a self-evident falsification of facts. Promised, 1903, ls "within two years," which of course did not materialize. Appar- erely a bit of stock-jobbery, and moribund.

OVITCH y LINGUARDO. **PERÚ.**
ce and mine: Morococha, Junín, Perú. Lands, one pertenencia, known Manuelita mine, which produced, 1904, with 10 men, ore of 17% average aking 118,956 lbs. fine copper.

N MINING & MILLING CO. **COLORADO.**
e office: Beulah, Pueblo Co., Colo. Lands, on Marion Creek, circa 12

miles southwest of Beulah, show a vein of 22′ reported width, carrying co zinc and lead ores. Has a concentrator, said to have cost $75,000, and Oct 1907, was said to employ 45 men.

MARITIME COPPER & REDUCTION CO. NEW BRUNSW

Mine office: Goose Creek, St. John Co., N. B. Property is an old showing a considerable body of low-grade copper ore. Idle since 1902.

MARKEEN COPPER CO. ARIZ

Dead. Lost charter, 1902, and lands, 1903. Formerly at Clifton, Gr Co., Ariz. Described Vol. IV.

MARKHAM GULCH MINING CO. UT

Letter returned unclaimed from former office, 53 Tremont St., Bo Mass. Mine office: Bingham Canyon, Salt Lake Co., Utah. Walter J. C general manager. Organized Sept. 29, 1906, under laws of Maine. Is trolled, through ownership of one-half of stock issue, by New Red Wing Mi Co., and is under same general management as the Utah-Apex and Utah velopment companies.

Property is a 200-ton concentrator, on the site of the old Red Wing which was running on ore from the New Red Wing mine, at last accounts.

MARQUETTE & ARIZONA MINING CO. ARIZ

Office: Marquette, Mich. Mine office: Bisbee, Cochise Co., Ariz. Marks, president and general manager; Jos. J. Wirtz, secretary. Orga Dec. 6, 1902, under laws of Arizona, with capitalization $500,000, share par. Lands, 37 claims, area 740 acres, having a heavy conglomerate cap similar to that of the Copper Glance, next west. Has a 560′ two-compart shaft, substantially timbered, passing through limestone showing conside iron, much of it assaying about $2 gold per ton. The shaft has short north south drifts, on the 400′ level, and one short drift on the 145′ level. H 35-h. p. hoist. Idle since 1903.

MARQUETTE COPPER MINING CO. MICHIGAN & WYOM

Office: care of Ney Mikkels, secretary, Niles, Mich. R. M. Kenney, president. Organized March, 1905, under laws of Oklahoma, with capita tion $500,000, shares $1 par. Lands, 120 acres, freehold, in Delta county, 20 acres, leasehold, in Marquette county, Michigan, and 160 acres, govern claims, in Uintah county, Wyoming.

ANGEL MARQUIEQUI. BOLI

Mine office: Coro Coro, La Paz, Bolivia. Mines, known as the San Mi and Toldo, carry native copper in conglomerate strata. Has steam power has been a small producer of barillas de cobre for some years.

MARSEILLES MINING CO. MEX

Office: 210 Bacon Bldg., Oakland, Cal. Mine office: Ejutla, Oaxaca, Roy Mauvais, president; W. H. MacMeekin, managing director. Lands, su claims near Los Ocotes mine, undergoing development.

MARSHALL & RUSSELL GOLD MINING, MILLING & TUNNEL CO. COLORA

Mine office: Empire, Clear Creek Co., Colo. W. C. Marshall, mana Organized 1901, under laws of Colorado, with capitalization $5,000,000, sh $1 par. Lands, 62 claims, developed by a 1,100′ tunnel showing auriferous argentiferous copper ores. Has water power.

GRUBE MARTINI. GERMA

Mine office: care of W. Von Vloten, Hoerde in W., Rheinprovinz, many. Has spathic iron and chalcopyrite, output being mainly iron ore which the production averages about 7,000 tons yearly. Has steam power employs about 50 men.

***MARYLAND* COPPER CO.** MONTA

Letter returned unclaimed from former office and mine, Mullan, Shos

Co., Idaho. Organized 1907, under laws of Idaho, with capitalization $1,000,000, shares $1 par. Lands are in the Burns district of Missoula county, Montana. Idle.

MARY MINING CO. **MEXICO.**

Office: care of John E. Carnahan, Canton, Ohio. Mine office: Jesús María, Rayón, Chihuahua, Mex. Wm. M. Blicker, first vice-president; Mrs. Elizabeth Seaman, second vice-president; J. Worth Carnahan, secretary; W. O. Evans, general manager; Dr. Leandro Routh, superintendent. Lands, 2 groups, presumably 9 hectares, opened by tunnel, showing auriferous and argentiferous copper and lead ores, said to give average assays of circa 9.5% copper, with small lead, silver and gold values. Has planned a smelter with 50-ton and 75-ton blast-furnaces, and a 100-ton concentrator, but apparently has built neither mill nor smelter.

MARY SCHULTZ COPPER KING MINING & SMELTING CO. **COLORADO.**

Office: care of Dr. Carl I. Schultz, president, Cripple Creek, Colo. Mine office: Salida, Chaffee Co., Colo. E. J. Vanatta, secretary; D. Mary Schultz, treasurer. Organized under laws of Colorado, with capitalization $1,000,000, shares $1 par. Lands, 13 claims, on Red Mountain, Frémont county, Colorado, 11 miles northeast of Salida, opened by a 150 shaft and a 180′ tunnel, showing considerable low-grade ore, with assays of 9 to 28% copper.

NEGOCIACIÓN MINERA MASCOTA, S. A. **MEXICO.**

Office: Ap. 840, Mexico, D. F. Mine office: Tequisistlán, Tehuantepec, Oaxaca, Mex. Emilio Maevers, president; Max von Duering, vice-president; Francisco Ponce de León, secretary and treasurer; R. W. Batelt, general manager. Organized Nov. 5, 1906, under laws of Mexico, with capitalization 200,000 pesos, shares 50 pesos par, divided into 2,000 free and 4,000 assessable shares. Assessments levied, $40,000. Lands, 262 pertenencias, in the mineral district of San Carlos Yautepec, including antiguas showing chalcopyrite and tetrahedrite giving average assays of 9.5% copper, 30 oz. silver and $5 gold per ton. Has steam power, with a 4-drill air-compressor. Fuel is wood. Nearest railroad, the National Tehuantepec, is 50 kilometers from the mine.

MASCOTA COPPER CO. **MEXICO.**

Office: 513 Germania Life Bldg., St. Paul, Minn. Mine office: Ameca, Jalisco, Mex. Employs 32 men. Chris. D. O'Brien, Sr., president; J. M. Bowler, vice-president; B. J. Mosier, secretary and treasurer; Chris D. O'Brien, Jr., general manager; preceding officers and Patrick Conley, directors; D. E. Baldwin, superintendent. Organized June, 1908, under laws of Arizona, with capitalization $1,500,000, shares $1 par; issued, circa $100,000.

Lands, 46 hectares, in the Guachinango division of the Mascota district, 4 miles from Mexican Central railway, showing an 8′ fissure vein in porphyry, traceable circa 2,000′ and proven to depth of 486′, giving average assays of circa 5% copper, 7 oz. silver and 6 grams gold per ton from oxide, carbonate and sulphide ores. Mine has a 300′ shaft and a 375′ tunnel, with 4,825′ of workings, estimated to show 40,000 tons of ore, with 28,000 tons blocked out for stoping.

Equipment includes a 50-h. p. steam plant, with 3-drill Sullivan air-compressor, and there are 17 mine buildings, including a store.

A wooden stamp mill, of 25 tons daily capacity, has 10 Allis-Chalmers gravity stamps.

A small concentrator is equipped with 2 Overstrom tables, vanner, 4 slime tables and sizer.

The company plans continuing the tunnel to length of 2,000′, and sinking 2 shafts, and possibly may build a small smelter.

MASCOTA MINING CO. **MEXICO.**

Office: *Chicago, Ills. Mine office:* Talpa de Allende, Mascota, Jalisco,

Mex. Harry S. Church, vice-president and general manager. Lands, 32 tenencias, known as the Ocotlán mine, 9 miles west of Talpa, in the cañ the Ocotlán River, heavily timbered, furnishing fuel for ordinary mine o tions. Mine shows a vein of 20′ to 60′ width, with a paystreak of 4′ t carrying auriferous and argentiferous copper and zinc sulphides. Dev ment is by tunnels and shafts, showing a considerable quantity of ore. erty has been worked previously, by German and Mexican companies.

Power is furnished from the Ocotlán river. An experimental lea plant was built in 1905. Smelter has roasting furnaces and a water-j blast-furnace. Heretofore the zinc values have been lost, but an effo planned to save them. Property is considered promising. Presumably idle

MASCOT COPPER CO. ARIZ

Offices: American Trust Bldg., Chicago, Ills., and Atlas Blk., Salt City, Utah. Mine office: Dos Cabezos, Cochise Co., Ariz. Hon. H. H. E president; David S. Stevenson, vice-president; J. C. Knapp, secretary; L. Ramsey, treasurer; L. G. Hardy, superintendent; E. A. Ely, assistant s intendent; Capt. B. W. Tibby, consulting engineer. Organized circa 1907, under laws of Arizona, with capitalization $10,000,000, shares $10 p $1,000,000 preferred and $9,000,000 common shares. Company has no co tion with the Mascot Mining Co., operating in the same county.

Lands, circa 43 claims, including property formerly held by Dos Ca Consolidated Mines Co., said to be held under bonds aggregating circa $50 Lands show 5 parallel fissures, of about 70′ aggregate width, in additi which the Skylight vein is claimed to be 200′ wide. Development is b Consolidated tunnel, showing ore assaying 3 to 14% copper, with fair and silver values.

MASCOT MINING CO. ARIZ

Office: 1009 Majestic Bldg., Detroit, Mich. Mine office: Willcox, Co Co., Ariz. Christian Kern, president; Geo. F. Scheffer, vice-president; Rohns, secretary; J. A. Zahn, treasurer; Delos D. Jayne, general manage W. Courtney, superintendent. Organized March, 1905, under laws of Ari with capitalization $1,000,000, shares $1 par; issued, circa $800,000. Com has no connection with the Mascot Copper Co., operating in the same co

Lands, 35 claims, unpatented, area circa 700 acres, lying about 40 northeast of Willcox, in the Clark and Montezuma districts, on the we slope of the Graham Mountains, in the western part of Graham county. P pal holdings are partially owned outright, and balance paid for, exce $19,000 final payment on bond, payable by royalties from ore, and 5 tional claims are held under bond and lease, subject to a cash paymen $3,750. Lands, in 4 groups, within 4 miles of each other, show mainly gra with some Carboniferous limestone, with frequent intrusive dykes of porp and rhyolite, carrying veins of 6″ to 20′ width, with copper and lead occasionally with high silver and gold values, principal ores being malac azurite, chalcocite, chalcopyrite and galena, usually with gangue of quartz, occasionally of decomposed limonite or hematite.

The Gold Cord group, 11 claims, shows a vein of 6″ to 22′ width, t able 2,000′, opened to depth of 107′, with circa 1,300′ of workings. Ores highly auriferous copper sulphides, assaying 1 to 3% copper only, with values up to circa $90 per ton, former shipments of circa 250 tons ha given average returns of $58 per ton. Equipment at the Gold Cord inc a 30-h. p. boiler, pumps and a hoist.

The Iron Bell group, 9 claims, 3½ miles from the Gold Cord, carries vein, opened by a 100′ shaft, showing ore assaying 1 to 15% copper and *1 oz. gold* per ton.

The President group, 3 claims, about 1½ miles from the Gold Cord, s

long tons. The property is carefully managed, and has a long an record as a producer.

MASON MANUFACTURING CO.

Works office: Houghton, Houghton Co., Mich. Livingsto president; Geo. F. Chauncey, vice-president and treasurer; Alfr manager. Organized circa August, 1907. Property is a 10-year Quincy sands, transferred August, 1907, from the Copper Conce to the Mason Manufacturing Co. Is controlled, through ownersh stock issue, by the Houghton Concentrating Co., successor of the centrating Co.

The mill is 72x122', with a wing of 38x58' containing the p and stands upon sands wasted from the Quincy mill. Sands fo are taken from the lake by a 16x28' scow carrying a 12x24' pumph a centrifugal sucker pump, connected by a 10" spiral pipe with t pipe having swing joints and being carried on bents. At the mill discharged into a launder, connecting with the boots of 6 endless- elevators, in 3 frames, each frame having 2 elevators, with 20 buckets. Formerly the discharge from the elevating belts led to jigs, each with 5x15' sieves, which rejected about 80 to 85% of t leaving 15 to 20% for concentration. The sand retained was coarse, fines and slimes, coarse sands being sent to crushing Chilean mill, thence joining the fines and going to the finishing were settling tanks for the slimes, the flow of diluted pulp throug being very slow, settlers discharging through siphon tubes at the slimes again going over oscillating tables. The company is using ventions of the manager, who installed one section of 20 ta Schwarz corrugated tops, and Schwarz classifiers. The Schwar said to have been technically successful, but the general opinion mill men is not especially favorable.

Power is furnished by a 250-h. p. gas engine, using produce from pea-coal. Equipment includes a 50-kw. generator for li operating the sand-pump. Machinery is belt-driven throughout.

These works were designed for the largest tailings plant in being of 2,000 tons nominal daily capacity, and Mr. Schwarz est there are available 12,000,000 tons of tailings, assaying 0.42% which 70% is recoverable. There has been trouble with the g which has proven unreliable, and steam power may be substituted. prise must be considered an experiment.

MASON VALLEY COPPER CO.

Dead. Was succeeded, January, 1907, by Mason Valley Min merly at Yerington, Lyon Co., Nev.

MASON VALLEY MINES CO.

Office: care of Geo. E. Gunn, general manager, Salt Lake City, office: Yerington, Lyon Co., Nev. W. Mont Ferry, president; J man, vice-president; Frank Judge, secretary; Llewellyn Humphr ing engineer; O. E. Cole, superintendent. Organized circa Dec under laws of Maine, with capitalization $1,000,000, shares $1 cessor of Mason Valley Copper Co. Lands, 8 claims, 1 fraction acres, including the Spragg mine, lying south of the Bluestone strong gossan, apparently opened on a contact deposit between p limestone, said to be of 70' average width, carrying a good showi carbonates from surface, changing to sulphide ore, with excess depth of about 100'. Has secured assays up to 55% in copper ten *cipal values* are in chalcopyrite apparently averaging about 4% *$1 per ton* in combined gold and silver values. Development is

tunnel. Has electric power and adequate mining equipment, employing circa 40 men. Property considered promising.

MASSASOIT GOLD & COPPER CO.

Office: 7 Water St., Boston, Mass. Location of lands, if any, unknown.

MASSASOIT MINING CO. **UTAH.**

Office: care of E. V. McGarrick, president, Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. Name changed, 1905, from Red Wing Extension Mining Co., to present title. Lands, 120 acres, adjoining the Red Wing, showing a 4' vein, giving average assays of circa 0.5% copper, 7% lead and 8.5 oz. silver per ton. Mine is said to show about 60,000 tons of ore. Life several years.

MASS CONSOLIDATED MINING CO. **MICHIGAN.**

Office: 1105 No. 6 Beacon St., Boston, Mass. Mine office: Mass, Ontonagon Co., Mich. Mill office: Keweenaw Bay, Houghton Co., Mich. Employs circa 250 men. G. A. W. Dodge, vice-president; Wilfred A. Bancroft, secretary and treasurer; Jas. M. Wilcox, superintendent; preceding officers, Thos. O. Nicholas, John W. Linnell, Jr., Fred W. Huntoo and Jerome P. Smith, directors; Jas. Satterley, mill superintendent; W. A. Brown, clerk; E. Fenner Dayton, engineer; Thos. Hall, mining captain; Samuel V. Rawlins, master mechanic at mine; Jas. Richards, master mechanic at mill.

Organized 1899, under laws of Michigan, with capitalization $2,500,000, shares $25 par; issued, $2,435,925. Paid in, $19. American Loan & Trust Co., Boston, registrar; Old Colony Trust Co., Boston, transfer agent. Annual meeting second Thursday in March. On Jan. 1, 1908, company had cash, accounts receivable and copper on hand, amounting to $128,454.56, with liabilities of $34,580.36, and on Oct. 1, 1908, had circa $80,000 cash on hand. In 1906 company lost, on operations, $103,696, and in 1907 loss was $56,272.

Present holdings of the Mass Consolidated include lands formerly held by various owners as five different mines. Considerable of the real estate stock is in the name of the Ridge Mining Co., which, at last accounts, had not been wound up, though the Mass Consolidated is supposed to own practically all of the outstanding stock, and plans winding up the Ridge and transferring its property to the Mass Consolidated. The lands were acquired largely through exchange, the principal property being the old Ridge mine, but the Mass was taken in preference to Ridge, from one of the same parties because the title to the Mass was clear, by purchase. The old Ogima Mining Co. was not wound up until after the Mass was organized, and the Ogima lands were sold originally by tax title, but a better title was secured. About 1897, the Ogima Mining Co. transferred to the Evergreen Mining Co. all right and title to the Evergreen lot under the option Ogima purchased in exchange for which the Evergreen deeded to the Ogima 40 acres of land from the northeast corner, adjoining the Ridge mine, to enable the Ogima to sink its shafts and work the conglomerate beds lying under part of the Evergreen lots. The existence of this old agreement between the Evergreen and Ogima, was unknown to the present management of the Mass at the time of taking charge last autumn, but notice was given by the Evergreen, a few days prior to the Evergreen lease must be discontinued, when negotiations were opened with the Evergreen and Butler Bros., the management keeping the matter quiet, in the hope of coming to an agreement with the Evergreen people, but, as they could not, last week, an agreement was not reached, and the lease will terminate on Monday, Nov. 30th.

Mineral lands were circa 2,400 acres, and in a very compact tract in Sections 31, 32 and 33 T. 51 N., R. 33 W., and Sections 5, 6 and 7 T. 50 N., R. 33 W., bounded on the north by the Ontonagon River, on the east by the Adventure, Trimble and Evergreen lots, on the south by the Ogima and Butler lots, and on the west by the Ridge and Mass lots.

the Flint Steel and the Knowlton mine of the Adventure, and on t
the Flint Steel, Adventure and St. Mary's Mineral Land Co. La
three old mines, the Ridge, Mass and Ogima, also two old prospects,
mac and Hazard, joint production of which, under previous m
was 11,131,023 lbs. fine copper. The Ridge mine, operated 1850-
5,134,449 lbs. copper, and paid dividends of $100,000. The old
opened 1856 and worked intermittently until 1886, secured a tota
5,014,266 lbs. copper, and the Ogima, opened 1860 and closed
982,308 lbs. copper. The Merrimac and Hazard were early-day c
without recorded production. These five properties are described
in Vol. II.

The Mass tract carries six of the seven cupriferous amygdal
Evergreen belt, these varying greatly from point to point, but
about 10′ width, with a sharp bend in their strike, this varying from
on the north, to N. 37° E. at the southern boundary. The dip o
varies from 38° at the Ridge to 47° at the old Mass mine. The cop
beds of the Evergreen belt on the lands of the Mass Consolidated
lows, from north to south:

1. Knowlton. Carries heavy copper and stamp rock.

2. Mass. Lies 140′ south of the Knowlton and carries a l
copper and stamp rock.

3. North Butler. Lies about 75′ south of the Mass bed, a
and fairly mineralized in places.

4. Butler. Lies about 200′ south of the North Butler, is 12′
and very bunchy, carrying mainly stamp copper, with occasional n

5. Ogima. Lies about 100′ south of the Butler. Is mainl
lode, with some barrel-work and occasional masses. Is 10′ to 2
shows little good ground.

6. Evergreen or Ridge. Lies about 250′ south of the Ogima
best lode of the property, ranging 4′ to 40′ in width, and usually b
where widest. Is very bunchy, but shows some excellent stop
heavy copper and stamp rock.

The Mass has openings on all of its copper-bearing beds,
hoisted through the nearest shaft, lodes being connected by c
various levels. The Mass carries the outcrop of the lodes of the
belt for about 1½ miles. Shafts A and B are connected, on the
down to and including the eighth level. The mine, as a whole,
rich in mass copper, and carries considerable silver values, but
is exceedingly bunchy, and ranges from very rich to absolutely n
siderable rock selection is made underground, and culls are used

Mining and tramming are done on company account, but, by
tive system, introduced by Capt. Wilcox, exceedingly good results
Daily, weekly and monthly reports of drilling and tramming are
laid before the workmen. As a result, the trammers are now a
tons daily, per man, as against 9 tons in 1906, while the drill-runne
practically double the work of two years ago, the lead in drilling
by Wm. Hocking, aged 63, with an average of 50′ to 60′ of hole
which is a phenomenal record, in such hard rock. The mine ha
tionally good crew of men, and, in January, 1908, produced, wit
including surface employes, 109 tons of stamp-rock per man, or a
the average production of the district as a whole.

A shaft, 1,757′ deep, formerly known as the Ridge, has 3 co
sunk on the Evergreen bed and connected with the Butler lode
on several levels. The Evergreen bed in this shaft runs 8′ to 1
showing considerable rock of good grade. The old shafthouse

whether the company can or cannot work the beds found by the Adve drill borings, on 320 acres of the Mass lands.

The Mass mill is at Keweenaw Bay, on an arm of Lake Superior, a junction on the Mineral Range and Duluth, South Shore & Atlantic rail 16 miles south of Houghton and 34 miles northeast of the mine, with a sand-room, deep water and immunity from heavy seas. The 90x232' built by the Wisconsin Bridge & Iron Co., is of steel frame on stone fou tions. Equipment includes 2 Nordberg stamps, having vertical mortar-g supplied with automatic hydraulic cleaning devices. Each head has a nor stamping capacity of about 525 tons daily, with actual daily average dut 480 to 500 tons. A Parnall-Krause atmospheric stamp of small size rec oversize material from the stamp-mortars. The Mass did stamping for Michigan, with one head, until Sept. 1, 1906.

The 30x60' boiler-house, at the mill, is of wood, with iron sheathing truss roof, housing two 225-h. p. Stirling boilers. Ashes and cinders washed into the lake, through a launder.

The 40x70' pump-house has a 16,000,000-gallon Nordberg vertical p fed from a 12x30' well, with bottom 6' 6" below mean water-level, conn with a tunnel running 300' under the bed of the bay to the intake.

A 1,000' wharf, also serving as a breakwater, has 18' of clear wat its end, equipped with three towers and derricks, capable of unloading vessels at the rate of 900 tons daily. Coal is taken from the wharf, in cars, by a 14x20" hoist, to a 1,500' trestle of 20,000 tons storage capacity

The mill also has a 30x40' warehouse, with office in front, a sm machine shop and about a dozen dwellings, on a townsite platted by the pany, this also having several business buildings.

Production has been as follows: 2,576,447 lbs. in 1903; 2,182,931 lb 1904; 2,007,950 lbs. in 1905; 2,106,739 lbs. in 1906; 2,078,677 lbs. in During the latter half of 1908 the mine was making circa 110 tons of mi monthly, which will give a decreased output for the year. For 1906, hoisted was 240,550 tons, of which 185,789 tons were stamped, yie 3,055,175 lbs. of mineral, returning 2,106,739 lbs. fine copper. For 1907 hoisted was 231,018 tons, of which 204,599 tons were stamped, yielding 57 lbs. of mass copper and 2,334,820 lbs. of mineral, with a net productio 2,078,677 lbs. fine copper, the proportion of mass copper per ton stamped 0.14%, percentage of mineral per ton of rock stamped, 0.57%, and perce of fine copper secured, per ton of rock stamped, being 0.508, or 10.16 lbs copper per ton. The Evergreen bed formerly was producing 75 to 80 to mineral monthly, but this has been reduced to about 25 tons per mont reason of loss of the lode on the Ogima lands.

Costs of the Mass are very high on copper, owing to the low gra rock stamped, but probably are the lowest in the Lake Superior distri the basis of rock tonnage. For January, 1908, costs were 83 cents pe for mining, 17 cents for rail transportation and 35 cents per ton for mill total of $1.35 per ton. If the rock averaged three-fourths of 1% fine c the mine could be made to pay handsomely, but, unfortunately, outside Evergreen lode, only about one-third of the rock opened averages as h 0.75% copper, balance of openings being in shafts, crosscuts and barren The local management of the Mass is exceptionally efficient, but it is c that the future hope of the property rests either in securing the ri mine the Evergreen lode, where now cut off, or in developing new beds ing payable copper at the southern end of the property, in line with portant and highly promising discoveries of the Lake and Adventure

MASSEY STATION MINING CO., LTD. ON

Office: 2501-43 Exchange Place, New York, N. Y. Mine office:

, Algoma, Ont. John W. Thompson, president; Robt. McKay, secre-
os. Errington, general manager. Organized 1900, under laws of On-
ith capitalization $1,000,000, shares $100 par. Is closely connected
e Orford Copper Co., which is controlled by the International Nickel
is said to have expended circa $300,000 on development and equip-
Lands, 640 acres, also 160 acres miscellaneous lands, in Salter town-
owing 3 ore bodies, of which 2 developed average 10′ width. One vein
traced for 4,000′, and opened to a depth of circa 600′, by a shaft
levels, opened 80′ apart, with considerable drifting on each level.
ft develops a vein 9′ wide at surface, and 12′ at the bottom of shaft,
ore of 3 to 5% copper tenor, with traces of gold and silver, and
l ore of much higher grade. Vein dips at 85°, and the mine is said
pwards of 50,000 tons of ore blocked out for stoping.
ore is a finely disseminated, silicious chalcocite above, succeeded by
nd in turn by chalcopyrite with similar gangue, not adapted to wet
tion, owing to excessive sliming, hence a 50-ton experimental oil
tor, using the Elmore process, was installed. Mining plant includes
nd 10x12″ Lidgerwood hoists, and a 6-drill Ingersoll-Sergeant air-
r. Property considered promising and management good. Presum-

ON GOLD & COPPER CO.

Had an office in Spokane, Wash., circa 1899.

SCHAFT KUPFERBERGWERK MAXIMILIAN. GERMANY.

office: Nieder-Ludgwigsdorf, Schlesien, Germany. Has 2 shafts,
a of 75 metres, and the August of 25 metres. Employs 40 to 50 men
s about 175,000 lbs. fine copper yearly.

Y MINING CO. UTAH.

Succeeded by May Day Mining & Milling Co. Formerly at Eureka,
Utah.

Y MINING & MILLING CO. UTAH.

office: Eureka, Juab Co., Utah. John Dern, president; preceding
S. McCornick, Jas. Chipman, M. P. Braffet and N. S. Neilson, di-
C. C. Griggs, superintendent. Capitalization was increased, June,
$800,000, shares $1 par. Is controlled, through ownership of one-half
issue, by Uncle Sam Consolidated Mining Co. Former dividend ratio
monthly, and dividend July, 1908, was 1½ cents per share, amount-
12,000. Paid $64,000 in dividends in year ending Apr. 1, 1908, leav-
lance of $9,084.11, which is an extremely small working balance for
nd-paying mine.

mine is operated in connection with the Uncle Sam, and ore is ex-
through the Uncle Sam shaft. The property is said to have a 15′ ore
tween the 100′ and 200′ levels. Principal values are in gold and sil-
carrying a little copper, secured as a by-product.

mill, rated at 50 tons daily capacity, was treating about 80 tons
ly, 1908, on two 8-hour shifts. A tram-line has been built from the
the old dumps, which are to be concentrated.

duction, 1907, was 153 carloads of ore and 15 carloads of concentrates,
at $151,337.33. Property is considered valuable and well managed.

LOWER MINING CO. MICHIGAN.

ce: 825-60 State St., Boston, Mass. Mine office: Calumet, Houghton
ch. H. F. Fay, president; Geo. C. Endicott, secretary and treasurer;
g officers, John C. Watson, Manning Emery and Stephen R. Dow,
. Organized 1899, under laws of Michigan, with capitalization
00, shares $25 par, $8 *paid in*. *Annual meeting*, third Wednesday in

Lands, 840 acres, in Sections 7 and 8, T. 56 N., R. 32 W., also a millsite on Torch Lake. The Kearsarge mine lies to the north, Old Colony to the south and the South Kearsarge and Wolverine mines to the west. Exploratory work was begun in 1899 and ended March, 1906. No. 1, or Faull shaft, 400′ deep, has considerable drifting on the first and second levels, and a crosscut opens two parallel cupriferous amygdaloids, showing occasional patches of copper, but nothing of promise. No. 2, or Isle Royale shaft, 160′ deep, has several hundred feet of drifting and shows a bunchy amygdaloid, 10′ to 12′ wide, carrying more or less copper in a 2′ streak next to the hanging wall. No. 3, or Sandstone shaft, is 60′ deep, in a soft and badly broken amygdaloid, all of the strata near the Eastern Sandstone being much disturbed. No. 4 shaft, 580′ deep, starts from surface on an unnamed amygdaloid lying approximately 2,000′ east of the Kearsarge bed, and at a depth of 425′ runs into a parallel amygdaloid lying 90′ to the eastward of the first bed. The copper showing is poor. A fairly complete geological cross-section has been obtained by drill-borings.

Surface improvements include a hoist good for 600′, boilers and air-compressor, with necessary buildings.

Cash balance, Jan. 1, 1908, was $43,650.85, company having received, during 1907, $35,000 from sale of land, with total expenses for year of $1,492.86. Idle.

MAY MINING CO. **ARIZONA.**

Office: care of M. L. Heffelman, manager, Sidney, Ohio. Mine office: Mayer, Yavapai Co., Ariz. Lands, 4 claims, 3 miles south of Mayer, in the Big Bug district, adjoining the Arizona Exploration Co. Has a 237′ shaft, with hoist good for 600′.

MAYO MINING CO. **MEXICO.**

Office: care of John E. Carnahan, Canton, Ohio. Mine office: Jesús Maria, Rayón, Chihuahua, Mex. Carlos Smythe, manager. Capitalization $1,000,000. Is a twin of the Mary Mining Co. Lands, said to be 3 mines, presumably 3 pertenencias, carrying argentiferous and auriferous copper ore. Presumably idle.

MAZAPIL COPPER CO., LTD. **MEXICO.**

Office: 47 Peter St., Manchester, Eng. Mine office: Concepción del Oro, Mazapil, Zacatecas, Mex. Works office: Apartado 17, Saltillo, Coahuila, Mex. Employs circa 3,000 men. Wm. Purcell, managing director; P. E. O. Carr, general manager; John Cooper, general mine superintendent; T. S. Abbott, engineer. Organized February, 1891, under laws of Great Britain; reorganized Apr. 21, 1896, and capitalization increased, 1903, to £300,000, shares £10 par; issued, £240,000.

Lands, 530 hectares, in 8 groups, comprising about half copper and half silver-lead claims. Principal properties are the Aranzazu and Cabrestante, producing copper ores, the San Elijio, Naranja, Cajon, San Francisco and Protrero, which are silver-lead mines, and the Promontorio group, producing fluxing ores. Copper ores occur in irregular masses, in limestone, near granite-porphyry contacts. In 1907 a 1,500-meter tunnel was started, from Concepción del Oro, to tap the Aranzazu mines at 500 meters depth, 200 meters below the present workings. It is expected that this tunnel, in addition to developing large ore bodies, will give sufficient water for the concentrator. The various mines of the company have 83 different shafts and tunnels.

The concentrator, at the mine, is of 150 tons rated daily capacity, but the district is arid, and operations are hampered frequently by shortage of water.

The property has 3 Roe aerial tram-lines, one, of 7 kilometers length,

built by Ropeways, Ltd., of London, having 23 tons hourly capacity, connecting the Aranzazu mine with the smelter at Concepción del Oro.

The company has two reduction plants, one at Concepción del Oro and one at Saltillo, former being somewhat antiquated. The Concepción del Oro works include a 150-ton concentrator and a 500-ton smelter having 3 copper furnaces. It was stated, August, 1907, that the company planned remodeling and enlarging this plant to 1,000 tons daily capacity, at a cost of circa $250,000.

The Saltillo smelter, completed 1906, does a general custom business, in addition to treating ores of the company. Equipment includes electric power, with alternating current generators direct-connected to 2 Harrison-Fleming Corliss tandem-compound condensing air-compressors. The Saltillo plant has 4 blast furnaces and one reverberatory, and a converter department with 4 stands.

The company maintains 3 hospitals, with a staff of physicians, and owns extensive general stores for supplying the needs of its workmen.

The company controls the Ferrocaril Coahuila y Zacatecas, with 78 miles of main line, running from Concepción del Oro to Saltillo, and the company said to plan building an aerial tram, to connect the mines with a railroad at San Pedro Ocampo.

Production has been as follows: 6,108,123 lbs. fine copper in 1903; 96,000 lbs. in 1905, and circa 7,250,000 lbs. fine copper, 7,000 tons pig lead, 100,000 oz. silver and 3,000 oz. gold in 1906, secured from 132,000 metric tons ore, averaging circa 3.5% copper, 13 oz. silver and 0.02 oz. gold per ton.

MAZATZAL COPPER CO. **ARIZONA.**

Office: Jerome, Ariz. Mine office: Payson, Gila Co., Ariz. Jos. J. Shaw, president and general manager; J. N. Boardman, vice-president; E. A. Macpherson, secretary and treasurer; preceding officers, H. Cram, A. J. Murietta, H. H. Hooker, John Henry, D. W. Scott and A. H. W. Eckstein, directors; A. Bergman, superintendent.

Organized Jan. 6, 1907, under laws of Arizona, with capitalization $500,000, shares $5 par; issued, circa $1,065,000. Annual meeting, in January.

Lands, 33 claims, in process of patenting, area circa 650 acres, also a acre millsite and sundry other lands, giving total holdings of 700 acres, circa 9 miles from Payson, in the Tonto basin, Mazatzal district, very difficult access, about midway between Jerome and Roosevelt, and circa 80 miles northwest of Globe, from which point the property is best reached, at present.

Property shows various ore bodies, of which one, under development, apparently is a series of lenses, of about 35′ average width, traceable circa 600′ and proven to depth of 180′, with slate hanging and porphyry foot, carrying cuprite, azurite, malachite and copper sulphides, estimated to average 5.5% copper, 3% lead, 2 oz. silver and 40 cents gold per ton. Development is by a 40′ shaft and by tunnels of 470′, 435′ and 400′.

Equipment includes a 50-h. p. steam plant, with double-drum hoist and a drill Ingersoll air-compressor, with 5 buildings.

Company plans sinking the shaft 200′, and extending No. 3 tunnel, known as the Bull Frog, and driving a tunnel to a second ore body. Property considered promising and management good.

MAZE MINE. **JAPAN.**

Mine office: Terado-muri, Nishi-Kambara-gori, Echigo, Japan. Mine, opened A. D. 1688, has several small veins, averaging 12″ width, carrying chalcopyrite and pyrite, frequently associated with sphalerite and galena, occurring mainly in propylite. Ore yields 17 to 20% copper, after careful selection. Production, which decreased for some years, was 110,582 lbs. fine copper in 1900. No later *returns of output and mine* probably idle.

MAZEPPA CONSOLIDATED MINING CO. **MEXICO.**

Dead. Was succeeded by Aguila Amalgamated Mining Co. Formerly at Hostotipaquillo, Ahualulco, Jalisco, Mex.

McALLISTER-ROWLAND COPPER MINING CO. **WASHINGTON.**

Dead. Property was an option on property of Ethel Consolidated Mines Co. Formerly at Index, Snohomish Co., Wash.

McCABE EXTENSION MINING & MILLING CO. **ARIZONA.**

Office: Prescott, Ariz. Mine office: McCabe, Yavapai Co., Ariz. Reese M. Ling, president; E. R. McDowell, secretary. Organized July 14, 1900, under laws of Arizona, with capitalization $1,500,000, shares $1 par. Lands, adjoining the McCabe mine, have a 300′ shaft. Company suffered internal dissensions, during which the original promoters stepped from under. Idle some years and apparently moribund.

McCONNELL COPPER MINING CO. **NEVADA.**

Mine office: Yerington, Lyon Co., Nev. Lands, 10 claims, from which a little ore ranging as high as 50% copper has been produced in the past. Presumably idle.

McDONALD-ELY COPPER CO. **NEVADA.**

Office: Salt Lake City, Utah. Mine office: Ely, White Pine Co., Nev. David Keith, president; Col. Enos A. Wall, vice-president; Frank Knox, treasurer; Geo. W. Parks, secretary; preceding officers, Hon. Thos. Kearns, Frank K. Wescott and W. G. Lamb, directors; D. C. McDonald, manager. Organized November, 1906, with capitalization $5,000,000. Lands, 27 claims, area 423 acres, in the eastern part of the Ely district, 7 owned outright and 19 held under bond and lease, showing a prominent blowout. Mine is opened by tunnel and several shafts, including the Mill shaft of 40′ and the Golden Gate shaft of 225′, showing auriferous copper ore. Has steam power and a 6-drill air-compressor, with a 100-ton mill and cyanide plant remaining from former mining operations for gold. Management is composed of experienced and successful mining men.

McGREGOR COPPER CO. **AUSTRALIA.**

Office: Queen St., Brisbane, Queensland, Australia. Organized under laws of Queensland with capitalization £150,000, shares 10s. par. Idle.

McGREW & SCHWARTZ LEAD & COPPER CO. **ARIZONA.**

Mine office: Florence, Pinal Co., Ariz. Has shafts of 80′ and 100′, showing good ore, and was developing at last accounts.

McKECHNIE BROS. **ENGLAND.**

Works office: Widnes, Lancashire, Eng. Works include an electrolytic refinery, of about 10 short tons daily capacity, having three 75-kw. generators and 234 tanks, with multiple arrangement of electrodes.

McKINLEY CONSOLIDATED MINES CO. **NEVADA.**

Dead. Succeeded the McKinley Mining & Smelting Co., of unfortunate memory, and was succeeded by the Willard-Ely Copper Co. Formerly at Ely, White Pine Co., Nev.

McKINLEY MINES, LTD. **BRITISH COLUMBIA.**

Office: care of A. M. McKenzie, secretary, Rossland, B. C. Mine office: Franklin, Boundary district, B. C. B. Lequime, president; H. W. Warrington, vice-president; C. L. Hammond, managing director; A. D. McPhee, superintendent. Lands, 4 claims, on the north fork of Kettle River, about 40 miles above Grand Forks, having an 80′ tunnel, said to show a vein of 112′ extreme width, carrying low to medium grade auriferous and argentiferous copper ore. Property considered promising. Idle.

McKINLEY MINING & DEVELOPMENT CO. **ARIZONA.**

Office: Prescott, Ariz. Mine office: Iron Springs, Yavapai Co., Ariz. *Chas. E.* McKinley, president and general manager; Geo. P. Ireland, vice-

president; Dr. H. T. Southworth, secretary; W. H. MacKay, treasurer; preceding officers and LeRoy Anderson, directors. Organized 1906, under laws of Arizona, with capitalization $1,000,000, shares $1 par.

Lands, 38 claims, area 760 acres, including the Dixie group, 6 claims, showing veins of 5′ to 15′ width, carrying auriferous and argentiferous copper ore, and the Peacock group, 11 miles south of Prescott, in the Copper River district, carrying a vein of 60′ estimated width, said to give average assays from surface ore, of 3.7% copper, with good gold values, and assays up to 15% copper, 5 oz. silver and $6 gold per ton, from sulphide ores in a 200′ shaft.

Company reports that it has steam, electric, water, gasoline and air power, with 2 hoists and a $60,000 order placed for a complete mining equipment, including air-compressors. Has 12 buildings. Management plans installing a 20-stamp mill and continuing development work on a considerable scale. Employs about 20 men, and plans increasing forces materially.

McKINLEY MINING & SMELTING CO. **NEVADA.**

Dead. Succeeded, circa 1906, by McKinley Consolidated Mines Co., also dead. Formerly at Ely, White Pine Co., Nev. Described Vol. VI.

McMILLEN-STONEWALL MINING CO. **ARIZONA.**

Office and mine: Globe, Gila Co., Ariz. V. Y. Smith, president and general manager; H. L. Coombs, treasurer. Organized March 27, 1907, under laws of Arizona, with capitalization $1,000,000, shares $1 par.

Lands, 32 claims, circa 20 miles east of Globe, carrying 3 miles of the strike of the Stonewall Jackson vein, of 40′ to 100′ width. The Stonewall Jackson mine, worked prior to 1883, is said to have produced about $500,000 worth of ore, carrying mainly silver values. Development is by the 3-compartment 200′ McMillen shaft, and the old 600′ Stonewall Jackson shaft, latter showing no stoping done below 230′. Equipment includes a 5-stamp mill and cyanide plant.

MEADOW MINING CO. **MICHIGAN.**

Office: 50 State St., Boston, Mass. Mine office: Copper Falls, Keweenaw Co., Mich. Wm. F. Fitzgerald, president; John Brooks, secretary and treasurer; Wesley Clark, agent. Organized 1898, under laws of Michigan, with capitalization $1,500,000, shares $25 par, as a reorganization of corporation of same name organized 1863, under special Michigan charter. Lands, 364 acres, adjoining the Humboldt and Phœnix mines, carrying the Ashbed lode, which was first opened 1851, with a little mining previous to 1860. The Ashbed is crossed by several transverse fissures, showing pits of prehistoric miners, and a little copper has been obtained therefrom. Fully described Vol. II.

MEADOW MOUNTAIN MINING CO. **COLORADO.**

Offices: Aspen, Colo., and Bangor, Me. Mine office: Crystal, Gunnison Co., Colo. F. O. Beal, president; J. T. Stewart, vice-president and general manager; Victor Brett, secretary; J. T. Bowler, treasurer; W. Porter Nelson, assistant secretary and treasurer; preceding officers and C. W. Coffin, directors; John Peters, mine superintendent. Organized under laws of Colorado, with capitalization $100,000, shares $1 par.

Lands, 8 claims, area 70 acres, also a 5-acre millsite, in the Rock Creek district, carrying 5 fissure and contact veins, latter between limestone and shale, of which 2, under development, average 5′ width and carry chalcopyrite giving average assays of 3.5% copper, 4% lead, 23% zinc, 6 oz. silver and $1 gold per ton. Has shafts of 100′ and 300′, and an 800′ tunnel, with about 2,750′ of underground openings, estimated to show 1,000 tons of ore blocked out for stoping. Has gasoline power.

MEDICINE BOW'S MINES CO. **WYOMING.**

Office and mine: Centennial, *Albany Co.*, Wyo. Employs 3 men. Jas. Christensen, *president; G. S. Simmons, vice-president* and superintendent;

Wm. Benton, secretary, treasurer and general manager; preceding offi
Corlett Downey and Ralph W. Morse, directors. Organized Sept. 19,
under laws of Wyoming, with capitalization $100,000, shares $10 par.

Lands, 10 claims, unpatented, area 200 acres, also a 5-acre millsit
the Holmes district, showing syenite, granite, diorite and limestone, ore b
occurring as fissures in syenite and granite, and as contact deposits bet
limestone and serpentine. There are 3 ore bodies, of which one, known a
Cuprite vein, under development, is of 15′ average width, traceable circ
mile, carrying chalcocite, bornite and chalcopyrite, with some oxidized
estimated by company to average 5% copper, 3 oz. silver and $4 gold pe
Test shipments have returned 7 to 15% copper, 2 to 12 oz. silver and $3 t
gold per ton. Development is by 10 pits and shafts of 10′ to 80′ depth,
960′ tunnel. The company estimates 40,000 tons of ore in sight, with
tons blocked out for stoping. Property was idle, 1905-1907, but was reop
1908, on a small scale.

MEDINA COPPER CO. ONTA

Office: 520 University Blk., Syracuse, N. Y. Mine office: El Do
Hastings Co., Ont. Organized under laws of Washington, with capitaliz
$750,000, shares $1 par, practically as successor of the Medina Gold M
Co., which went out of business suddenly, after paying several dividends,
sumably unearned. Apparently has disposed somehow of its lands
Dorado, to the Ontario Copper Co., which is practically under the same
agement. Is not regarded favorably.

MEDINA GOLD MINING CO. ONTA

Dead. Succeeded, circa 1907, by Medina Copper Co. Formerly
Dorado, Hastings Co., Ont. Described Vol. VI.

MEDORA MINE. MICHI

Owned by Keweenaw Copper Co.

MEGORRIS COPPER CO. ARIZ

Mine office: Silver Bell, Pima Co., Ariz. Mervin Rice, president; W
Coe, secretary. Capitalization, $600,000. Lands, sundry claims, in the
Hat district, said to show good ore. Not favorably regarded, idle some
and apparently moribund.

MEGUNTICOOK GOLD & COPPER MINING CO. COLOR

Office and mine: Lake City, Hinsdale Co., Colo. P. G. Dawson,
director, at last accounts. Capitalization $400,000, shares $5 par. Idle
apparently hopelessly insolvent.

GRUBE MEHLBACH. GERM

Letter returned unclaimed from former office, Weilmünster, He
Nassau, Germany. Has auriferous and argentiferous lead, copper and
sulphides, with steam and electric power.

MELBA MINING CO. ARIZ

Dead. Formerly at Patagonia, Santa Cruz Co., Ariz.

MELCZER MINING CO. MEX

Office: 1104-27 William St., New York, N. Y. Mine office: Pesq
Ures, Sonora, Mex. Company holds direct title to property formerly cl
by the Copete Mining Co., and transferred later thereby to Copete Co
dated Copper Co. For further light on a complicated and rascally situ
see Copete Mining Co.

MELKEDALEN COPPER MINES, LTD. NORW

Dead. Reorganized, 1904, as Melkedalen, Ltd. Formerly at Ev
Ofoten Fjord, Tromsö, Norway.

MELKEDALEN, LTD. NORW

Office: 23 Leadenhall St., London, E. C., Eng. Mine office: Ev
Ofoten Fjord, Tromsö, Norway. Geo. Book Mee, chairman; W. A. St

secretary; J. D. Holman, consulting engineer. Organized Apr. 26, 1904, under laws of Great Britain, as a reconstruction of the Melkedalen Copper Mines, Ltd., with capitalization £125,000, shares 10s. par; issued, £78,103. Lands, 440 acres, freehold. An electric railroad, connecting mines with the sea, was under construction, 1908. Mill, near Rosevanden, rated at 150 tons daily capacity, was begun June, 1907. Company plans operations on the basis of a yearly production of 60,000 tons of iron pyrites and cupriferous pyrites, to be exported.

MELROSE COPPER MINE. **AUSTRALIA.**

Office: 10-114 Pitt St., Sydney, Australia. Mine office: Condoblin, Cunningham Co., N. S. W., Australia. H. Ernest A. Miller, managing director and secretary; Geo. Eason, treasurer; preceding officers and Samuel Solomons, directors; Malcolm Darrach, mine superintendent. Organized Dec. 1, 1903, under laws of New South Wales, with capitalization £12,000, shares £5 par.

Lands, 2 claims, area 120 acres, held under 21-year lease from the crown, at 5s. royalty per acre yearly, with option of renewal, also a 10-acre water-right, in the Melrose and Condoblin districts. Property is well timbered, but water is scarce, nearest permanent water being the Lachlan River, 26 miles south. The government railway is 29 miles distant. Mine was first known as the Boone West, and later as the Anaconda.

Property shows uptilted Silurian slates, merging into schistose slate, carrying fissure veins with chutes, of which 4 are proven, these ranging 6′ to 20′ in width, 30′ to 50′ in length, and depth, proven on the Southern chute, of 280′. Development is by shafts of 95′, 280′, 65′ and 100′, and by a tunnel. No. 1 chute carries 3′ of chalcocite and 3′ of mixed ore. No. 2 chute has a paystreak carrying cuprite and chalcocite, balance of vein carrying chalcopyrite, of circa 4% tenor, with combined gold and silver values of circa 16s. per long ton, with gangue of altered iron sulphides. No. 3 chute shows 6′ of lead and copper ores. Values are erratic, ranging from 2.5 up to 30% copper, with a general average, for pay ore, of 6 to 8% copper, circa 3 oz. silver and 2 dwts. gold per ton. Management estimates about 15,000 long tons of ore in sight, with circa 8,000 tons blocked out for stoping.

The mine has no machinery equipment, using horsepower and windlass. Property considered promising.

MEMPHIS COPPER CO. **NEW MEXICO.**

Office: 601 Postal Bldg., Kansas City, Mo. Mine office: Organ, Donna Ana Co., N. M. J. I. McCullough, president and general manager; J. R. Bowersox, vice-president; Hill P. Wilson, secretary; F. M. Johnson, treasurer; preceding officers, C. B. Gill, G. F. Sanford, J. T. Wallace and A. M. Peck, directors Organized June, 1905, under laws of New Mexico, with capitalization $1,000,000, shares $1 par. Has 2 shafts, of circa 175′ each, and shipped from same, 1905, ore worth $7,965, averaging 17.5% copper and 7 oz. silver per ton. Presumably idle.

MEMPHREMAGOG MINING CO. **QUEBEC.**

Mine office: Bolton Centre, Brome Co., Quebec. Property is the Smith mine. Idle some years.

LORENZO MENA. **CHILE.**

Office: Cabildo, La Ligua, Aconcagua, Chile. Mine office: Nipa, La Ligua, Aconcagua, Chile. Lands include La Mina Cata, at El Quemado, 9 kilometers from Cabildo, showing a vein of 6′ to 7′ average width, in granite, with strike N. 20° W., and dip of 78°, carrying cupriferous pyrite with calcite gangue, averaging only 4 to 5% copper tenor, and available mainly as a fluxing ore. Production, 1903, was circa 1,800 metric tons of 4% ore, secured by 35 men. La Mina Santa Rosa y Anexas has a vein of 2′ to 3′ width, opened to depth of 140′ and length of 200 meters, producing, 1903,

circa 30 tons of 30% ore, after hand selection. Production, 1903, esti
at 125,000 lbs. fine copper.

MENDOCINO COPPER KING MINING CO. CALIFO

Mine office: Yorkville, Mendocino Co., Cal. Has slight developme
tunnel. Idle since circa 1903.

MENDOZA CONSOLIDATED COPPER CO. ME

Office: 709-104 North Spring St., Los Angeles, Cal. Mine office: La
Sur, Baja California, Mex. Juan H. Mendoza, president; Jesse J. MacD
general manager. Has auriferous and argentiferous lead and copper
carrying values mainly in the precious metals. Has a mill with cru
10-stamps and a Huntington mill. Was said to employ circa 150 men, a
time, which probably was an ovestimate. Idle at last accounts.

MENLO PARK COPPER MINING CO., LTD. NEW JE

Dead. Formerly at Menlo Park, Middlesex Co., N. J.

SOCIEDAD ANOMINA COBRES DE MENORCA. SP

Offices: Gran Via, 32, Bilbao, Spain. Mine office: Mercadal, M
Menorca, Spain. Cirilo de Gana, president; Fernando Olascoaga, vice-
dent; Manuel de Ozamir, secretary; Esteban Puego, managing director; I
de Prisbuer, purchasing agent; Santiago de Arechago, consulting engineer.
ganized October, 1901, under laws of Spain, with capitalization 2,000,00
setas, shares 250 pesetas par, 35% paid up.

Lands, 411 hectares, including the Rubia, Partida, Emilia and other
per mines, at the base of Mt. Toro. Presumably idle.

JOSÉ DEL C. MENSES. CH

Mine office: El Cobre, La Ligua, Aconcagua, Chile. Property i
Nueva and La Esperanza mines, showing a vein of 2 meters average
with northeasterly-southwesterly strike, carrying sulphide ores. In 1903
duced circa 600 tons of 5% copper ore with 14 men.

AKTIESELSKABET MERAKER GRUBER. NOR

Office and mine: Meraker, Trondhjem, Norway. P. C. Soelberg,
man; Edmund Harbitz, vice-chairman; Fr. Krohg, secretary; R. Sive
treasurer; Joh. C. Andresen, managing director; M. Rasmussen, superin
ent; Harold Dahl, mill superintendent. Organized 1906, under laws of
way, with capitalization 1,200,000 kroner, shares 500 kroner par. Ore c
1.5 to 6% copper, and 45 to 47% sulphur. Company plans an ultimate y
productive capacity of 50,000 metric tons of ore.

MERCEDES COPPER CO. ME

Office: care of I. K. Franklin, Nogales, Ariz. Mine office: Santa
Magdalena, Sonora, Mex. Under development with a small force since
1905.

MERCER-SAN RAFAEL MINING CO. ME

Mine office: Tapalpa, Sayula, Jalisco, Mex. Lands are on the ea
slope of the Sierra Cacoma, circa 21 miles west of Ayutla. Topograp
rugged, and claims are well located for development by tunnel. Pro
shows a wide belt of quartzite and diorite. Mine is an antigua, ores car
gold, silver and copper values, with a little lead and zinc. Equipmen
cludes a water-power installation, 5-stamp mill, cyanide plant and patio
a concentrator is planned.

MERCER SYNDICATE. ARIZ

Mine office: care of W. H. Mercer, P. O. Box 56, Globe, Gila Co.,
Lands, sundry claims, in vicinity of the Five Points property, on wh
shaft was sunk in 1906. Presumably idle.

MERISSKI WORKS. RU

Office: care of R. A. Richner, Batum, Russia. Mines office: Kutais,
sia. Production, 1899, was 164,092 lbs fine copper. Presumably idle.

MERRILLA COPPER MINING CO. AUSTRALIA.

Mine office: Goulburn, N. S. W., Australia. Has a 124′ shaft, with cross cut at 112′, expected to cut ore.

MERRIMAC COPPER CO. COLORADO.

Dead. Formerly claimed to be located at Taylor, Colorado, which is not a postoffice.

MERRY ENGLAND SYNDICATE. NEW GUINEA.

Mine office: Port Moresby, New Guinea. Property, adjoining the Astrolabe, was under development, on a small scale, early 1908.

MESA MINING & REDUCTION CO. ARIZONA.

Dead. Formerly at Mesa, Maricopa Co., Ariz.

MESCALERO MINING & MILLING CO. NEW MEXICO.

Mine office: Roswell, N. M. Mine office: Parsons, Lincoln Co., N. M. J. A. Ryan, president; J. A. Cottingham, secretary; John S. Lenox, general manager; James E. Hunt, superintendent; John Kinnie, mill superintendent. Mine, developed by a 400′ tunnel, carries auriferous and argentiferous copper ores. Has steam and electric power, 20-stamp mill, concentrator, 100-ton cyanide plant and 50-ton smelter. Presumably idle.

MESCAL MINING CO. ARIZONA.

Office: Southern Trust Bldg., Little Rock, Ark. Mine office: Jerome, Yavapai Co., Ariz. Employs 10 men. Capt. Samuel B. Adams, president; Wm. M. Kavanaugh, treasurer; preceding officers, C. Traves Drennen, J. E. Keeper and Walter C. Miller, directors; J. Prather, secretary; Jas. F. Mowing, superintendent. Organized under laws of Arizona, with capitalization $1,500,000, shares $1 par.

Lands, 7 claims, 3 patented, in Mescal Gulch, near Mingus Mountain, showing fissure veins in slate and contact deposits between slate and diorite. Main ore body, of circa 3′ width, traceable circa 1,600′, opened to depth of 145′ by an 85′ shaft and tunnels of 220′ and 900′, with circa 1,200′ of workings, shows chalcopyrite assaying 1 to 2% copper, with a trace of gold.

Property has 5 buildings. Company plans continuing development by tunnel, and eventually sinking a shaft.

MESCAL MINING & MILLING CO. ARIZONA.

Dead. Formerly at Providence, Yavapai Co., Ariz.

MESSINA COPPER EXTENSIONS, LTD. TRANSVAAL.

Office: P. O. Box 1955, Johannesburg, Transvaal. Organized under laws of Transvaal, with capitalization £3,000, shares £1 par; fully issued. Owns 100 base metal claims, on the government farm Mondfarian No. 3, on the Limpopo River, in the Zoutpansberg district, Transvaal. Name changed, cash and reorganization proposed, at last accounts.

MESSINA (TRANSVAAL) DEVELOPMENT CO., LTD. TRANSVAAL.

Offices: 6 Princes St., London, E. C., Eng. Mine office: Messina, Zoutpansberg, Transvaal. Arthur M. Grenfell, chairman; Sir Lewis Michell, J. S. P. Samborne, J. P. Grenfell and R. J. Frecheville, directors; Wm. Challis, secretary; Chas. Stuart, chairman local board; C. [illegible], secretary local board; J. M. Calderwood, consulting engineer; [illegible], manager.

Organized Jan. 30, 1905, under laws of Great Britain, with capital £110,000, increased, Jan. 27, 1908, to £200,000, shares £1 par. Of £50,000 authorized, £43,500 issued, at 6%, and company has power to issue of £210,000 convertible debentures, at 6%, for redeeming debentures, acquisition of additional lands and [illegible].

Lands are 1,200 claims, on the farm Berkenrode, [illegible] lease from the Transvaal government, also 3 freehold farms, of circa 14,000 acres, to which the farm Vogelzang [illegible].

rode, and carrying the extension of the Messina ore bodies, was added, 1908. Lands formerly were in dispute with the Oceana Consolidated Co., Ltd., but satisfactory titles have been secured. Lands are near the Limpopo River, and water is available at fairly shallow depth. The property carries some timber fit for mining and building purposes, with good timber circa 50 miles distant.

The property shows extensive remains of ancient workings, with scoria from old smelting operations. Formation is mainly granite, carrying a mineralized zone of circa 1,300′ width, having 5 parallel veins, traceable several miles. There are two main ore bodies, of which the north main lode has been proven for 1,700′ length and the south main lode for 2,400′. Ore is largely chalcocite, with considerable bornite and chalcopyrite, and the property shows very high grade ore in quantity.

The mine is opened by 7 shafts, mainly shallow, No. 3 shaft being 315′ deep, with 3 levels opened, the bottom level, at 300′, showing a 42″ vein of chalcocite, giving average assays of 25.25% copper. Workings, July 1, 1908, aggregated 11,774′ in length, and for year ending June 30, 1907, development was 220′ of sinking and 3,328′ of drifting and crosscutting. Ore reserves, Jan. 1, 1908, were estimated at 15,423 long tons, averaging 24.04% copper, with 4,236 tons of second grade ore, assaying 11.06% copper, on surface. On July 1, 1908, the mine had upwards of 7,000 tons of high grade ore blocked out, for stoping. The figures of ore reserves are conservative, and, despite the exceedingly high average assay tenor, the estimates of values are reliable.

Equipment includes a double hoist and 3-drill air-compressor. Property has a number of good buildings, including shops, engine houses and dwellings for officials. Wood and coal are scarce, but it is thought that coal exists on the Rhodesian side of the Limpopo River.

The 50-ton mill, designed by Mr. Calderwood, begun work May 1, 1908. Equipment includes a Blake crusher, delivering ore to a 70-ton bin, whence it is fed automatically to coarse crushing rolls, and delivered therefrom to a bucket elevator, which leaves crushed ore at the top of the mill, whence it is delivered through spout to the first of a series of 4 revolving trommels having water sprays. Mill equipment includes Hartz jigs, 2 Wilfley tables and classifiers. The mill has a monthly productive capacity of about 250 long tons of concentrates, averaging 64.05% copper, with rich middlings and slimes accumulated for future treatment. The mill has reservoirs for water supply, obtained from the mine and a well, and fuel is gas, obtained from a Tangye suction gas producer plant, retorting charcoal.

Transportation facilities are poor, consisting mainly of donkey wagons from the mine to Pietersburg, via Brak River, a distance of 180 miles, with a freight rate of £6 per ton. A new government wagon-road will aid greatly, and a railroad to the district is projected by the Transvaal government.

There is a shortage of native labor, which has hampered operations materially.

The management plans building a small smelter, to have a reverberatory furnace, and such a smelter should pay for itself within a short time, owing to high freight rates, though the scarcity of fuel might render smelting difficult and costly.

Considerable production has been secured, under disadvantageous circumstances, ore being hand-cobbed and brought up to high tenor on picking-tables and hand jigs. Production, for two years ending Dec. 31, 1907, was 2,616,000 lbs. fine copper. For fiscal year ending June 30, 1907, production was 2,967 long tons of ore, averaging 23.9% copper, by assay, of which 768 tons, 10 cwts., assaying 60.66% copper, were shipped to London, yielding 1,044,219 lbs. fine copper, realizing £24,626 and returning a net profit of £14,832. For fiscal year

ending June 30, 1908, ore shipped averaged 58.03% copper, and yielded gross returns of £33,102.

The Messina is a property of exceptional promise, and has been excellently handled. It is the principal and only important copper producer of the Transvaal, and bids fair to develop into a large and profitable mine.

METALS MILLING CO. **ARIZONA.**

Mine office: Walker, Yavapai Co., Ariz. Geo. C. Marrs, superintendent. Property is the Shelton group, carrying auriferous and argentiferous copper ores. Has steam and electric power and 10-stamp mill.

COMPAÑIA METALURGICA. **CHILE.**

Office: Santiago de Chile. Mine office: Chuquicamata, Calama, Antofagasta, Chile. Organized March 9, 1905, under laws of Chile, with capitalization 2,500,000 pesos, shares 100 pesos par.

COMPAÑIA METALURGICA NACIONAL. **MEXICO.**

Is the Mexican incorporation of the National Metallurgical Co.

METATES MINING CO. **MEXICO.**

Letter returned unclaimed from former office, Columbus, Ohio. Mine office: Guadalupe de los Reyes, Cosalá, Sinaloa, Mex. Organized December, 1902, with capitalization $1,000,000, shares $1 par. Is controlled, through stock ownership by Sinaloa Exploration Co. Lands are circa 80 miles north of Mazatlán. Apparently moribund.

METHOW GOLD & COPPER MINING CO. **WASHINGTON.**

Office: 77 Jamieson Blk., Spokane, Wash. Mine office: Winthrop, Okanogan Co., Wash. W. D. Scott, president; J. N. Tewinkel, secretary and treasurer. Organized, 1889, under laws of Washington, with capitalization $50,000, shares 5 cents par. Lands, 8 claims, area 150 acres, showing fissure veins in metamorphosed conglomerates of Huronian age, carrying sulphide ores assaying 9% copper, 2 oz. silver and $5.50 gold per ton, developed by a 200' shaft and three tunnels, longest 564'. Has available water power and timber. Idle several years, except for annual assessment work.

METROPOLITAN MINING CO. **WASHINGTON.**

Mine office: Berlin, King Co., Wash. Ores carry gold, silver and copper. Has water power. Idle several years.

COMPAÑIA METALURGICA MEXICANA. **MEXICO.**

Office: 82 Beaver St., New York, N. Y. Mine offices, Sierra Mojada, Mouclova, Coahuila, Mex., and Concepción del Oro, Mazapil, Zacatecas, Mex. Works office: San Luis Potosí, S. L. P., Mex. Employs circa 1,300 men. Robert S. Towne, president and treasurer; Geo. Foster Peabody, first vice-president; A. Foster Higgins, second vice-president; Chas. J. Nourse, Jr., secretary and assistant treasurer; Donald C. Brown, general manager; Geo. T. Carnahan, general mine superintendent; J. L. Saint-Dizier, assistant superintendent; C. M. Van Cleve, smelter superintendent; Frank W. Carnahan, engineer; T. L. Carnahan, local superintendent at Concepción del Oro; J. M. Williams, Jr., local superintendent at Sierra Mojada; W. K. Woodard, local superintendent at San Luis Potosí.

Organized 1890, under laws of New Jersey, with capitalization $4,000,000, shares $100 par, in $1,500,000 cumulative 8% preferred, $1,750,000 cumulative 6% second preferred, and $1,750,000 common stock. Bonds $2,000,000 at 6%, sinking fund, 2% per annum of outstanding bond issue. Mercantile Trust Co., New York, registrar. Annual meeting, first Monday in June.

Property interests are extensive, including control of numerous mining, transportation and land companies, among the more important of which are the Sombrerete Mining Co. and the Mexican Lead Co., at Sombrerete, Zacatecas, Mex., and the Montezuma Lead Co., Alvarez Lead & Zinc

can Mineral Railway Co. and Potosí & Rio Verde Railway Co. The company owns extensive tracts of timber lands, and has steam and electric power.

The Veta Rica mine, at Sierra Mojada, produces silver-lead and copper ores, latter averaging circa 3% copper, 5% zinc and 20 oz. silver per ton. Development is by a 600' main shaft, and values are mainly in lead and silver.

The Cerro Prieto and adjoining mines, at Concepción del Oro, are developed by tunnels, producing auriferous copper ores.

The San Pedro and San Pablo mines are important producers.

The smelter, of circa 750 tons daily capacity, has a modern equipment throughout, including 12 furnaces for reduction of gold, silver and lead ores, and a special copper department of 100 tons daily capacity. The works have steam and electric power, and employ circa 1,000 men. The company is a large producer of lead and silver, with considerable outputs of copper and gold, secured mainly as by-products.

MEXICAN-AMERICAN SMELTING CO. **MEXICO.**

Letter returned unclaimed from former office, 24 Broad St., New York, N. Y. Works office: Guaymas, Sonora, Mex. Supposedly is controlled by Greene Gold-Silver Co. Property is a smelting plant, nominally rated at 250 tons daily capacity, apparently incomplete, and never blown in.

MEXICAN-ARIZONA MINING CO. **ARIZONA.**

Dead. Absorbed, 1903, by New England & Clifton Copper Mines of Arizona. Formerly at Clifton, Graham Co., Ariz.

MEXICAN COPPER CO. **ARIZONA.**

Dead. Formerly at Martinez, Yavapai Co., Ariz.

MEXICAN COPPER CO. **MEXICO.**

Mine office: Salinas del Peñon Blanco, Salinas, San Luis Potosí, Mex. Has steam and gasoline power and a small smelter. Idle.

MEXICAN COPPER REDUCTION CO. **MEXICO.**

Office: care of J. A. Haralson, vice-president and general manager, Mexico, D. F. Works office: San Luis de la Paz, Guanajuato, Mex. R. Marsans, president; J. E. Hartman, secretary; preceding officers, E. Benoit and O. C. Omer, directors. Property apparently consists of a patented process of reduction, by which the company expects to reduce ores without fluxes.

MEXICAN COPPER SYNDICATE, LTD. **MEXICO.**

Dead. Formerly had an office at St. George's House, Eastcheap, London, E. C., Eng.

MEXICAN DEVELOPMENT CO. **MEXICO.**

Office: 69 Wall St., New York, N. Y. Mine office: Coapa, Morelia, Michoacán, Mex. Geo. Buckman, president; G. E. Fauquier, vice-president; C. D. Knapp, Jr., secretary and treasurer. Organized 1906, under laws of Maine, with capitalization $2,000,000. Is a holding company only, controlling, through stock ownership, the Santa Emilia Copper Co.

MEXICAN EXPLORATION & MINING CO. **MEXICO.**

Office: 42 Broadway, New York, N. Y. Mine office: Sauqui de Batuc, Ures, Sonora, Mex. Organized 1908, to take over all rights and concessions of the Yaqui Development Co. Has authorized a $1,500,000 bond issue. Is said to control, through ownership of 51% of issued stock, the Douglas Copper Co., and apparently was organized to finance the Douglas Copper Co. and its allied and subsidiary corporations. Lands are reported to be mineral rights to 2,165 square miles, including a number of antiguas.

MEXICAN INVESTMENT & DEVELOPMENT CO. **MEXICO.**

Office: 82 Wall St., New York, N. Y. Operating office: Guanajuato, Gto., Mex. Mine office: Autlán, Jalisco, Mex. Employs 150 men. Dwight Furness, *president and general manager*; B. Morgan Esler, vice-president; Wm. Eaton, *secretary and treasurer*; S. N. Craig, superintendent; H. P. Wherry, mill super

tendent. Organized under laws of Arizona, with capitalization $300,000, hares $5 par.

Lands, 158 acres, also miscellaneous lands of 2,100 acres, former including he Agua Blanca mine, area 40 hectares, 30 miles northeast of Autlán and bout 75 miles from a railroad. The Agua Blanca, opened circa 1860, by John nd Edward Blake, and the leading copper mine of Mexico for two decades, hows diorite and andesite, carrying fissure veins with a brecciated zone of 30' o 50' width, traceable 2,000', carrying mainly chalcopyrite of 4 to 5% copper enor, the Agua Blanca being unique among the copper mines of the district n carrying neither gold nor silver values.

Development is by a 150' shaft and a 1,000' tunnel, showing about 30,000 netric tons of ore.

Equipment includes a 75-h. p. steam plant at the mine, 25-h. p. hoist and 2 mine buildings, including a 20x40' stone machine-shop.

The 100-ton concentrator, 50x150', of wood, has an 80-h. p. steam plant, 2 Hurtevant crushers of 200 tons daily capacity, 3 rolls, four 3-compartment igs, 2 Wilfley tables and one slime table, putting about 8 into 1, and producing irca 300 tons of concentrates monthly, which are shipped, by mule, to Ameca, hence by rail to Aguascalientes smelter.

A hydro-electric power installation has been given tentative consideration. Company plans continuing development, and hopes to produce about 1,000,000 bs. fine copper in 1909. Property considered valuable and management good.

MEXICAN MINERALS CO., LTD. **MEXICO.**

Office: 28 Budge Row, London, E. C., Eng. Letter returned unclaimed from former mine office, Zimapán, Hidalgo, Mex. S. Crowder, managing direc-or. Organized under laws of Great Britain, with capitalization £36,000; issued, £31,507. Debentures, £10,000. Lands, 300 hectares, including the Montezuma mine, carrying auriferous and argentiferous ores of copper, developed open-cast, with a hydro-electric power installation. Idle several years and mori-bund.

MEXICAN MINES CORPORATION. **MEXICO.**

Office: 25 Broad St., New York, N. Y. Mine office: Baca, Hidalgo, Chi-huahua, Mex. C. L. Graves, general manager; W. D. Pearce, resident manager; E. J. Ernest, mine superintendent. Organized under laws of Maine, with cap-italization $3,500,000, and is protocolized in Mexico. Lands are 4 groups, includ-ing the Ventura mine, about one-half mile from the Mina Cigarrero, having a 230' three-compartment shaft, showing fissure veins carrying streaks of aurif-erous and argentiferous copper below commercial grade. Is said to have de-veloped a little ore of commercial tenor.

MEXICAN MINES SYNDICATE, LTD. **MEXICO.**

Letter returned unclaimed from former mine office, Cusihuriáchic, Iturbide, Chihuahua, Mex. Chas. Moffat, manager. Property is La Reina mine, carry-ing argentiferous and auriferous lead and copper ores, latter secured in small quantities, as a by-product. Has gasoline power and 3 Huntington mills.

MEXICAN MINING & DEVELOPMENT CO. **MEXICO.**

Office: 511 Baker Blk., Springfield, Mo. Mine office: Ocotlán, Oaxa-, Mex. S. W. Grant, president; J. A. Taylor, vice-president; C. E. Davis, secre-tary; H. Parmenter, treasurer; C. C. Goldsworthy, mine superintendent. Cap-italization $1,250,000

MEXICAN MINING, REFINING & EXPLORATION CO. **MEXICO.**

Office: 501 I. W. Hellman Bldg., Los Angeles, Cal. Mine office: Ha-illo, Sonora, Mex. Employs 25 men. Wm. T. Calderwood, president and gen-eral manager; F. H. Vahrenkamp, vice-president; F. C. Lamb, secretary and treasurer; preceding officers, Chas. S. Montgomery, F. L. Wil-Lovis, directors; F. Smith, superintendent; H. H. Light, engineer.

Apr. 20, 1904, under laws of Arizona, with capitalization $5,000,000, shares $1 par.

Lands, 104 hectares, in 2 groups, first being the Creston de Cobre, circa 25 miles west of Hermosillo, said to be an antigua dating from the eighteenth century. This group shows 5 ore bodies, of which 3, under development, are reported by the company as of 30′ to 40′ width, carrying oxidized and sulphide ores of copper and lead assaying 7% copper, 50% lead, 80 oz. silver and $3 gold per ton. Development is by 5 shafts, of circa 1,000′ aggregate depth, and by a 300′ tunnel, estimated to show 100,000 tons of ore, which seems entirely too high. Property has a 30-h. p. steam plant, with 2 hoists.

Lands also include La Cobriza group, at Soyopa, area 4 hectares, said to show a 16′ vein with a 7′ paystreak carrying ore of 10 to 25% copper tenor, with silver values.

MEXICAN MINING SYNDICATE. **MEXICO.**

Dead. Formerly at Acuitzio, Morelia, Michoacán, Mex. Described Vol. VII.

MEXICAN SMELTER CO. **MEXICO.**

Office: Chicago, Ills. Works office: Pedriceña, Cuencamé, Durango, Mex. Property is a 50-ton furnace, built on the patents of Jas. E. Anderson, using petroleum for fuel.

MEXICAN SMELTING CORPORATION. **MEXICO.**

Office: 678 Salisbury House, London, E. C., Eng. Works office: Monclova, Coahuila, Mex. Maj.-Gen. G. de la Poer Beresford, chairman; A. F. Roberts, secretary Organized Aug. 29, 1908, under laws of Great Britain, with capitalization £150,000, in 100,000 ordinary shares of £1 par and 1,000,000 shares of 1s. par. Debentures, £200,000 first-mortgage profit-sharing debentures at 6½% authorized; £15,600 issued. Lands, circa 3,000 acres. Company is said to plan a $1,000,000 smelter, to compete with the American Smelting & Refining Co.

MEXICAN SMELTING & REFINING CO. **MEXICO.**

Works office: Taxco, Alarcón, Guerrero, Mex. Lawrence Tatum, president and general manager; Fredk. M. Perkins, superintendent. Lands, 200 hectares, including several antiguas, principal being the San José mines, carrying auriferous copper ores, with values mainly in silver. Has gas power, and a 60-ton smelter with water-jacket blast-furnace and a small refining furnace.

MEXICAN UNION MINING CO. **MEXICO.**

Office: 753 Monadnock Bldg., Chicago, Ills. Mine office: Unión de Tula, Autlán, Jalisco, Mex. Newton B. Storer, president; Chas. G. Thompson, secretary; Wm. H. Lees, general manager; B. W. Sweet, mill superintendent and engineer. Organized April, 1902, under laws of Arizona, with capitalization $1,000,000, shares $1 par.

Lands, 100 pertenencias, area 247 acres, in the Ayutla district, including the Soquite Prieto mine, having a 30′ fissure vein, with laterals, in limestone, opened by a 275′ shaft, showing carbonate ores, chalcocite and chalcopyrite giving assays of 7% copper, 10 to 50 oz. silver and from a trace to $10 gold per ton. Has a 75-h. p. steam plant and is said to have contracted for the development of a water power. The 35-ton concentrator has a 7x9″ Dodge crusher, one train of rolls, one 5′ Huntington mill and 3 Overstrom tables.

MEXICAN WESTERN DEVELOPMENT CO. **MEXICO.**

Office: 71 Broadway, New York, N. Y. Mine office: Chamela, Jalisco, Mex. John Hays Hammond, president; Maj. Frederick R. Burnham, general manager. Lands include the Rosario, La Luz and other mines, in the Bramador district.

MEXICOLA GOLD-COPPER MINING CO. **COLORADO.**

Dead. Formerly at Howard, Frémont Co., Colo., and Cripple Creek, Teller Co., Colo. Described Vol. VII.

MEYER-CLARK-ROWE MINES CO. **ARIZONA.**

Mine office: care of A. N. Forbes, agent, Tucson, Pima Co., Ariz. Lands, 7 claims, area 140 acres, known as the San Xavier group, 20 miles south of Tucson, showing argentiferous lead, zinc and copper ores. Is claimed to have 10,000' of openings. Presumably idle.

MIAMI COPPER CO. **ARIZONA.**

Dead. The first company by this name, having Samuel L. Gibson as president, was organized 1905, with capitalization $500,000, shares $1 par, and was succeeded, Nov. 30, 1907, by present company of same name. Formerly at Globe, Gila Co., Ariz.

MIAMI COPPER CO. **ARIZONA.**

Office: 42 Broadway, New York, N. Y. Mine office: Globe, Gila Co., Ariz. Employs circa 150 men. Adolph Lewisohn, president; J. Parke Channing, vice-president; Julius H. Susmann, treasurer; preceding officers, Wm. H. Nichols, Jacob Langeloth, Walter T. Rosen and Ralph C. Lupton, directors; Herman Cook, secretary; Louis A. Wright, general manager; F. C. Alsdorf, assistant general manager; N. O. Lawton, mine superintendent; H. Kenyon Burch, mill superintendent; Edw. C. Taylor, clerk.

Organized Nov. 30, 1907, under laws of Delaware, with capitalization $3,000,000, shares $5 par, fully issued and fully paid. Is controlled, through ownership of one-half of stock, by General Development Co. National Copper Bank, New York, registrar; Bankers Trust Co., New York, transfer agent. Shares are listed on the Boston stock exchange. Annual meeting, third Wednesday in April.

Lands, 22 claims, partly fractional, area 200 acres, in process of patenting, also 100 acres in mill and smelter sites, giving total holdings of circa 300 acres, in the Red Springs district, 6 to 8 miles west of Globe. Property includes water rights on Pinal Creek, carrying abundant water for a large mill.

The property shows an area of highly silicified Pinal schist, at or near the point of contact with Schultze granite. The schistose area shows strong evidences of shearing, and mineral occurs as veinlets and coatings of chalcocite on the brecciated material, with some chalcopyrite showing on the 470' level. The ore body is leached above a depth of 220', and is somewhat similar to the Ely and Bingham porphyry deposits, but is higher in average tenor, the mean of numerous assays being 2.9% copper.

Development is by two 3-compartment shafts, known as the Red Rock and Red Springs, a third shaft of 220' depth, and a new 4-compartment main working shaft. The mine had 7,677' of workings Oct. 15, 1908.

Principal developments are on the Red Rock shaft, which cut commercial ore at 220', and was 720' deep Nov. 1, 1908, with levels opened at 270', 370' and 470', and with plats cut for levels at 570' and 670'. The 270' level of this shaft shows about one acre of ore of commercial tenor, while the 370' level, only 100' lower, shows a very much larger ore body, and the 470' level shows a still greater increase. The exact dimensions of the payable area of ore have not been determined on either the 370' or 470' levels, but the entire development is under about 20 acres of ground, with the certainty of further payable ore beyond the limits yet proven, and a strong likelihood that workable ore will be found to extend to the Red Springs shaft, to the northward. The schist, at a depth of 570', apparently averages about 1.5% copper only, and it is likely that the limits of payable ore in large quantities will be reached at approximately 500', though it is not unreasonable to expect a considerable tonnage of commercial ore at various points below this depth. On Nov. 1, 1908, the workings in this shaft had blocked out, on 3 levels, circa 4,000,000 tons of ore, with about 2,500,000 tons additional practically blocked out, and with about 10,000,000 tons fairly in sight.

The Red Springs shaft, 2,150′ northwest of the Red Rock shaft, was sunk 348′ deep Oct. 15, 1908, and shows ore of about the same grade as the Red Rock shaft, with good prospects of developing a large ore tonnage, and a reasonable chance of proving a continuous ore body between the two shafts.

Extraction is to be through a 14x18′ main working shaft, with 4 compartments, sunk outside of the proven mineral zone, in order to render it immune from drawing. This shaft will operate two 8-ton skips, and will have a 2,000 tons daily productive capacity.

Equipment includes a 250-h. p. hoist and air-compressor, pumps, etc., and a heavy equipment will be given the 4-compartment shaft. Buildings include a general store, for the convenience of employes.

Survey has been made for the extension of the Gila Valley, Globe & Northern railway to the mine, and this is to be built in 1909.

Careful study is being given to the matter of reduction, and an experimental mill has been built, with one Nissen stamp, 2 Johnson vanners and Wilfley tables. A careful study is being made of the porphyry mills of Utah and Nevada, and it is not likely that the company's concentrator will be in operation before 1910. The mill will be built at the mine, and water pumped in from Pinal Creek, which is the correct method. The company's first plan called for a first-unit mill of 1,000 tons daily capacity, but ore has been developed so rapidly, and in such enormous quantities, that two units may be built, as soon as the metallurgical processes are fully decided upon. The ore concentrates readily 10 into 1, and possibly may concentrate 12 or even 15 into 1, though necessarily with higher tailings losses, and the ratio of concentration will be determined by the mean between the point of highest concentration and that of lowest losses. The company's estimates, which are conservative throughout, having been prepared by Mr. J. Parke Channing, are based on a final copper extraction of 2% only, from ore of 2.9% average copper tenor, but it is probable that, in actual practice, extraction will average better than 40 lbs. per ton, and possibly as high as 45 lbs. per ton, or 2.25%.

An initial milling unit of 1,000 tons daily capacity would give the property a productive capacity of 12,000,000 to 15,000,000 lbs. fine copper yearly, while a 2,000-ton mill would make it possible to produce 25,000,000 to 30,000,000 lbs. fine copper per annum. Mr. Channing estimates that copper can be laid down in New York for 9 cents per pound, and his figures are entitled to exceptional weight, for the reason that similar predictions by the same authority, made in the earlier stages of development, have been fully verified in the cases of the Tennessee and Nevada Consolidated, where Mr. Channing laid bare to the public figures, and deductions therefrom, that usually are withheld, thereby proving the courage of his convictions, and reaping the reward of confidence due the man whose forecasts come true.

The Miami was unique among American copper mines in the method of its flotation. The company advertised extensively, in the daily press, its advertisements being strong, but conservatively worded. As a rule, advertised stocks in the United States are put out by utterly irresponsible parties, though the British method of promotion calls for extensive advertising. The company secured $1,000,000 additional by selling its treasury stock, September 1908, and is in a strong position financially. The Miami is a property of altogether exceptional promise, and is practically certain to make a very large and profitable mine, while the management is thoroughly experienced and capable, with the prestige of success in other fields.

MICHIGAN-ARIZONA COPPER CO. **ARIZONA**

Office: 2 Ingersoll Block, Lansing, Mich. Mine office: Bonita, Graham Co., Ariz. Emory W. Olds, president; John Holbrook, vice-president; Dr. F. *F. Allen, secretary*; Jacob Stahl, treasurer; preceding officers and M. H. Jew

s. Organized June 17, 1907, under laws of Arizona, with capitalization 00, shares $1 par. Lands, 80 acres, in the Sulphur Springs Valley, at t of Graham Mountain, showing two 8″ parallel veins of ore assaying 9% copper, with traces of gold and silver, opened by a 42′ shaft.

AN & ARIZONA DEVELOPMENT CO. **ARIZONA.**

ce: 905 Metropolitan Life Bldg., Minneapolis, Minn. Mine office: , Pima Co., Ariz. C. C. Prindle, president; R. M. Bennett, vice-presi- has. W. Sexton, secretary and treasurer. This company reorganized etia Copper Co., under a plan of reconstruction explained in Vol. V. is a considerable share interest in the Helvetia, and about 40 unde- claims adjoining the Helvetia.

AN-ARIZONA MINING CO. **ARIZONA.**

e: 17 First St., Muskegon, Mich. Mine office: Mammoth, Pinal Co., H. Hamilton, president and general manager; James Hamilton, vice- ; Theo. P. Swift, secretary, treasurer and engineer. Organized Aug. under laws of Arizona, with capitalization $5,000,000, shares $1 par. ls, 7 claims, area 140 acres, in the Bunker Hill district, 22 miles from a showing fissure veins, and impregnations in the granite, and, at times, ated masses of country rock, with porphyritic intrusions. Has a 50′ l tunnels of 93′ and 150′, showing cuprite, melaconite, malachite, chal- d occasional chrysocolla, giving average assays of 29.2% copper, 5 oz. d $1.20 gold per ton. Company planned a small concentrator. Pre- idle.

AN BOY MINING & MILLING CO. **WYOMING.**

. Formerly at Encampment, Carbon Co., Wyo.

AN & COLORADO MINING & MILLING CO. **COLORADO.**

: Colon, Mich. Mine office: Florissant, El Paso Co., Colo. W. H. president; J. W. Bryant, vice-president; Dr. A. J. Kiser, secretary; mebaugh, treasurer; John M. Kellogg, general manager. Organized 1902, under laws of Michigan, with capitalization $500,000, shares $25 ual meeting, first Tuesday in December.

s, 14 claims, area 280 acres, also a 5-acre millsite and sundry water neceeded to properties of Colorado Springs Copper Mining & Tunnel Blue Mountain Copper Mining Co., circa January, 1906. Development el. Presumably idle.

N COPPER & GOLD MINING CO. **UTAH.**

: 404 West Third South St., Salt Lake City, Utah. Mine office: aver Co., Utah. Michael H. Osborne, president; L. C. Johnson, sec- Organized December, 1902, under laws of Utah, with capitalization shares $1 par. Lands, 4 claims, area 80 acres, known as the New p, in the San Francisco district, near the Horn Silver mine, opened haft. Idle several years, except for assessments levied.

N COPPER MINING CO. **MICHIGAN**

: 15 William St., New York, N. Y. Mine office: Rockland, Ontonagon Mich. Employs 360 men. Jos. E. Gay, president; C. R. Corning, J. Wheeler Hardley, secretary; John R. Stanton, treasurer; perintendent; Barney P. Shearer, mill superintendent; C. N. Adolph Priess, mining captain; Henry Stubensky, clerk; r mechanic.

ized Jan. 5, 1899, under laws of Michigan, with shares $10 par; $19 paid in. Last assessment, 1908. American Loan & Trust Co., Boston, trans st Co., Boston, registrar. Annual meeting, first 4,870 acres of mineral territory, 1,466 acres of nds, and a 150-acre millsite, giving total holdi

mineral lands being in Sections 1, 2, 3, 9, 10, 11, 13, 14, 15, 16, 1
24, 25, 26 and 27, Town 50 North, Range 30 West. The main tra
east and west by 4½ miles north and south, in addition to which t
scattering tracts to the westward, one of 40 acres, two of 80 ac
one of 160 acres, all carrying the outcrop of the Calico amyg
Michigan lands include the old Minnesota, Rockland and Su
The Superior made 567,331 lbs. fine copper, 1856-1869 and 1876-187
land, lying next east of the Minnesota, was operated 1853-1
6,210,309 lbs. fine copper, from the Minnesota contact vein, wh
about 2′ width and carried considerable silver, in that mine. Th
sota mine, opened 1847, closed 1870, made 34,704,668 lbs. fine cop
dividends of $1,820,000.

The Minnesota, or Minesota mine, as it was then spelled, w
by a line of prehistoric pits, in one of which was a 6-ton mass of c
on skids, on top of which grew a hemlock tree having nearly 400
nual growth. Immense masses of virgin copper were taken from th
the largest, found 1856, measuring 12′ 6″x18′ 6″x46′, weighing 52
and requiring the work of 20 men for 15 months in cutting it into
enough for hoisting. The Minnesota was opened on a contact ve
gangue of quartz, epidote and calcite, with an amygdaloidal hang
glomerate footwall, both impregnated with copper near the cont
called the Minnesota a conglomerate mine, because more copper
the footwall than in the denser amygdaloidal hanging-wall. The ri
occurred near the "counter vein," a transverse fissure. The M
10 shafts, deepest circa 1,100′. Four central shafts were sunk
on the North Minnesota fissure, which joined the contact vein
depth. The Minnesota had a 40-ton mill, with gravity stamps,
duction was mainly from masses, and the smaller pieces of native
barrel-work. In 1870 the old Minnesota company met, sumulta
prices for copper, a pinching of the vein, and the necessity for m
hoists, and gave up the struggle. The openings above the adit lev
from water, were worked by tributors, for years afterwards, and
dreds of tons of mass and barrel copper, affording evidence that a
of heavy copper must remain in the lower stopes, then inaccessible
because filled with water, and these also should yield considerable
left unmined in the days when nothing under 3% rock paid for m

The Michigan mine is a combination of two entirely new mi
opened old mine, its shafts being sunk on the Calico amygdaloid
cropping 140′ north of the Minnesota contact vein, and a few f
the North Minnesota fissure. In addition to the Calico lode, Minne
North contact and Branch vein, all more or less developed by the p
ings, the Michigan tract carries the Knowlton, Mass, Ogima and
daloid beds, also an unnamed amygdaloid farther south, these latt
to the Evergreen belt, worked a few miles to the northeastward
and Adventure mines. The Knowlton, or northernmost of the Eve
of parallel lodes, lies circa 1,000′ south of the old Minnesota sha
amygdaloid, supposed to be the Butler, opened to some extent
Bluff, 2,000′ south of B shaft, shows heavy copper and stamp rock
3 old shafts on the Butler lode, also an adit cutting several pa
crous beds. There also are copper-bearing amygdaloid outcrops
Calico bed, on which no work has been done.

The Calico amygdaloidal bed parallels the contact vein of the
sota mine, which has been reopened to some extent by crosscuts.
rock is a melaphyr trap, and the Calico bed ranges from almos
nearly a conglomerate, carrying considerable felsite, with occasion

large patches of prehnite, epidote and calcite. The strike of the Calico is approximately N. 68° E., with a dip of about 47° to 50° at the bottom ie mine. The Calico bed is 5′ to 25′ in width, with an average of about the upper workings, but, on the 2,000′ level is only 4′ to 6′ wide, though in copper. Most of the copper in the upper workings occurs in a 2′ to 3′ reak near the footwall, though occasionally patches of good ground occur ie center, and on the hanging-wall. The Calico copper carries a little , and is mostly in nodules, called shot-copper, with occasional barrel- and some small masses, the heavy copper occurring mainly near the sections of numerous cross-fissures that are filled with clay gouge. The s strong, standing well without timber, and is sinuous, both as to strike lip, with very irregular walls, the amygdaloid bed merging into the trap all by almost imperceptible degrees. There also is a marked tendency e part of the Calico to split, the "footwall vein" being rich in such but leaving the main bed very lean in copper. There also is a "hang- all vein," and branch veins, in addition to which are the Minnesota t and North Minnesota fissure veins, within 140′ distance of the Calico. he "Branch Vein" lies between the Calico amygdaloid and the Minne- ontact vein, closely underlying the former on the fifth level, but steadily ng therefrom until it touches the contact vein just above the thirteenth rolling away therefrom again at greater depth. The "Branch Vein" row, being 3′ to 5′ in width, but very rich, and is now the largest pro- of heavy masses of native metal in the Lake Superior district, a 20-ton found 1905, having been the largest mass of native copper secured from ake Superior mine for some years. The eastern drifts of the "Branch " makes the best showing, as a rule. The "Branch Vein" is thought identical with the "North Vein" formerly worked in the Rockland now a part of the Michigan, tributary to C shaft. The "Branch Vein" about 30 lbs. fine copper per ton and furnishes about one-third of the ge and one-half of the copper production of the mine, product being ximately one-third heavy copper and two-thirds stamp copper. The nch Vein" dips at approximately 58° and carries largely mass and copper with considerable stamp rock. The "Branch Vein" has been for about 2 miles and has considerable reserve openings. The heavy from the "Branch Vein" is in pieces weighing from a few hundred p to 20 tons each, and 2 men using pneumatic chisels are employed ily, cutting these masses into pieces sizable for hoisting.

he mine has about 10 miles of workings and is opened by 3 shafts, all on the Calico bed, reaching the other copper-bearing beds and veins by uts. The mine works 45 drills. With the exception of the ninth level vels down to the twelfth have reached the northern boundary of o bed.

shaft, the westernmost, lies about 1,000′, on the strike of the the boundary line of the National mine. This shaft is 7x16′ in rs, with 3 compartments and is 2,030′ in depth. The Calico in places, in some of the upper levels, and shows some excellent ascent on the 14th level, sent to the contact vein of the old the latter to average about 4′ in width, and to be rich in ce of about 150′ only.

shaft, 985′ east of A, with 2 compartments, is 1,781′ deep en deepened for several years. The Calico bed runs in the upper workings, and the lower levels show haft has a Burnham sinking pump, with capacity of nute from a quarter-mile depth. The old Minnesota , from B shaft, by diamond drill holes, bored

level. The old workings were found in very bad shape, after three decades of neglect. The contact vein is reached also by crosscuts on the 11th and 13th levels, below the bottom of the old workings, showing a vein of 20′ width with 6′ to 7′ on the hanging-wall carrying copper in fair quantities.

C shaft, 1,353′ northeast of B, is 1,650′ in depth, and rock production was begun therefrom circa February, 1908. The formation is somewhat more settled than to the westward. Adjoining C shaft is an old shaft of the Minnesota, of circa 675′ depth, with collar 90′ below the collar of C shaft.

There is room on the main tract of the Michigan for an additional shaft west of A, and the great extent of the landed holdings provides ample room for opening mines on any other available cupriferous bed that may be developed on any part of the company's lands.

The shaft-rockhouses at A and B are duplicates, each having 800-ton storage bins, and were partially remodeled, 1908, and given double dumps, the lower for poor rock. Equipment of each includes a 50-h. p. Nordberg engine, two 18x24″ crushers, one 13x20″ crusher and a steam-hammer for mass and barrel work.

The engine-house, 50x115′, stands midway between shafts A and B. The A section has a 24x60″ Webster, Camp & Lane double-cone straight-face hoist, with a 7′ drum having a 15′ face, carrying 4,000′ of cable and capable of raising 4-ton skips in counterbalance at 3,500′ per minute from a depth of 3,500′. The hoisting cable passes around solidly anchored sheaves, giving a straight pull at each shaft. The B hoist, installed 1905-1906, is a 24x60″ Allis-Chalmers duplex-cylinder straight-face hoist, operating 2 drums in balance, or separately, also good for 3,500′ depth. The hoist at C shaft, formerly at B, is 13x15″, with 6′ drums. The boiler-house, between the two sections of the engine-house, has four 165-h. p. Burt locomotive firebox boilers, with room for a fifth, also a 1,000-h. p. Cochrane feed-water-heater and purifier. The power-plant includes a 40-drill Ingersoll-Sergeant two-stage air-compressor. A 12-drill Norwalk air-compressor and a 10-drill Ingersoll-Sergeant air-compressor, displaced by the new compressor, have been installed in the basement of the engine-house, as auxiliaries.

The machine shop is 30x60′, and other mine buildings include a stone smithy, carpenter shop, warehouse, office building, and a 22x50′ changing house. Water is secured from the old Minnesota dam, the mine and location having mains and hydrants, with a Knowles pump in the basement of the power-house capable of raising a 5″ stream against a 460′ head, and an auxiliary Deane pump, 200′ distant, capable of raising a 5″ stream against a head of 425′. There are acetylene gas plants in the power-house and in each rock-house, and a 250′ coal-trestle, with inclined tunnel and tramway underneath, leading to the boiler-house. All buildings are connected by a private telephone system, and the mine is served by the Mineral Range railroad.

In view of the very promising developments of the Lake Copper Co., and the rich drill cores secured by the Adventure, diamond drilling was begun July, 1908, in search of the extensions of these beds in the southwest quarter of Section 14. The Michigan lands carry about 3 miles of the hypothetical extension of the veins opened by the Lake and cut by the diamond drill of the Adventure, and the prospects of finding payable ore bodies in this territory are excellent, as the field is practically unexplored. The diamond drill, late 1908, cut 3 fine-grained metamorphosed conglomerates, somewhat resembling the Calumet conglomerate, each carrying copper in somewhat encouraging quantities. The drill also cut a 12′ amygdaloid, from which the sludge assayed 1.29% copper, and cores from several other beds carried copper in promising quantities, though none were notably rich.

The Superior mine, about one mile east of the present workings, is a property of some promise.

Production was begun Nov. 12, 1903, with a leased head, at the Mass mill. This was surrendered Sept. 1, 1906, since which date rock has been stamped at the Atlantic mill.

Work was begun April, 1906, on a new mill, to cost circa $200,000, about one mile north of the Mass mill, on Keweenaw Bay, with ample water frontage for the wasting of sands. Construction was suspended, late 1907, on account of unsettled financial conditions, but was resumed in 1908. The mill, of steel, under construction by the Wisconsin Bridge & Iron Co., is 97x177′ in size, and is to have a 750-ton Nordberg steeple-compound stamp, with Woodbury jigs. The rock-bins are of exceptionally large size, and the equipment will include a 5-stamp gravity battery and 10 Overstrom tables, installed by the Michigan company in the Mass mill.

The mill is to have a central power plant, with a separate boiler building, of concrete, equipment including an engine, 3 Atlas boilers and a Sturtevant economizer.

The power plant will have a coal trestle, from which coal will be dumped in two piles, flanked by two tunnels, through which coal will be trammed in cars to the boiler-house. At the top of the trestle there will be a hoist, to take cars from the railroad to the bins.

Water will be secured from Keweenaw Bay, through a 1,200′ tunnel, nearly completed, connecting with a 76′ shaft at the millsite. Instead of having a separate boiler-house for the pumps, there will be a motor-driven pump, taking energy from the generator in the mill. It is estimated that the new mill will save about one cent per pound on the cost of finished copper. The copper of the Michigan has the highest electrical conductivity of any Lake Superior brand, showing, on test, conductivity up to 103.

Production, in pounds of fine copper, has been as follows: 275,708 lbs. in 1903; 2,746,127 lbs. in 1904; 2,891,796 lbs. in 1905; 2,875,341 lbs. in 1906; 1,865,404 lbs. in 1907. Production, October, 1908, was 193 tons of mineral, from 600 to 700 tons of rock stamped daily, and production for 1908 should be approximately 3,000,000 lbs., the largest yet secured. Rock stamped was 140,225 tons in 1906, and 150,407 tons in 1907, returns being 20.5 lbs. fine copper in 1906 and 17.72 lbs. in 1907. Total expenses in 1907 were $645,056, including $183,671 for new construction. Costs, less construction, per ton of rock treated, were $2.84 in 1904; $2.63 in 1905; $2.79 in 1906 and $3.06 in 1907. Costs per pound of fine copper, exclusive of construction, were 21.5 cents in 1904; 18.9 cents in 1905; 20.5 cents in 1906 and 17.72 cents in 1907. With the aid of the new mill the property should be able to make a considerably improved showing, and the prospects of finding payable copper beds in the southern portion of the Michigan territory are excellent. The management of the property is of the best, throughout.

MICHIGAN & MONTANA COPPER MINING & SMELTING CO. MONTANA.

Office: Kalispell, Mont. Mine office: Altyn, Teton Co., Mont. J. M. Harris, manager, at last accounts. Lands, some distance from rail transportation, carry auriferous and argentiferous copper ores, giving fair assays. Is said to have a 100-ton concentrator. Idle.

MICHIGAN & MONTANA DEVELOPMENT CO. MONTANA.

Office: care of E. J. Rompf, secretary and treasurer, Houghton, Mich. Letter returned unclaimed from former mine office, Butte, Silver Bow Co., Mont. Capt. Richard Edwards, president; Thos. F. Burgan, vice-president; preceding officers, Jas. T. Healy, W. A. Burritt and Thos. O. Bennetts, directors. Organized March, 1907, *with capitalization* $500,000, shares $10 par. Lands,

4 claims, held under bond and lease, in the Park Cañon district of Butte, said to show a 75′ lode. Idle and presumably moribund.

MICHIGAN & MONTANA MINING & DEVELOPMENT CO. **MONTANA.**

Office: Escanaba, Mich. Mine office: Wickes, Jefferson Co., Mont. Clark Kirkpatrick, president; J. F. Carey, secretary; Jas. A. McKillican, superintendent. Organized 1905, with capitalization $20,000, and reorganized with capitalization $100,000.

Lands, 5 claims, including the Blue Bird mine, formerly operated for silver, showing a vein of 4′ to 6′ width, opened by a 1,200′ tunnel, giving assays of 5 to 7% copper, 5% lead, 23 oz. silver and $2.80 gold per ton. Property has electric power and employs circa 20 men.

MICHIGAN & NEW MEXICAN MINING CO. **NEW MEXICO.**

Office: Ishpeming, Mich. Mine office: Nogal, Lincoln Co., N. M. W. A. McIver, deceased, was president. Lands are known as the Mildon group. Idle and apparently moribund.

MICHIGAN-NEW MEXICO COPPER CO. **NEW MEXICO.**

Office: Grand Rapids, Mich. Letter returned unclaimed from former mine office, Lordsburg, Grant Co., N. M. J. L. Hamilton, president; C. R. Luton, secretary and general manager. Lands, 4 claims, area 80 acres, known as the Dakota-Pearl mine, in the Burro Mountains, carrying ore assaying up to 8.5% copper, 5 oz. silver and $4 gold per ton. Has a 280′ shaft, and planned installing a 50-ton leaching plant and smelter, but failed to do so. Idle several years and apparently moribund.

MICHIGAN SMELTING CO. **MICHIGAN.**

Office: 82 Devonshire St., Boston, Mass. Works office: Houghton, Houghton Co., Mich. Wm. A. Paine, president; Chas. H. Paine, vice-president; Frederic Stanwood, secretary and treasurer; Frederick I. Cairns, general manager; preceding officers and John R. Stanton, directors; Frank Klepetko, consulting engineer; John Mugford, superintendent.

Organized 1903, under laws of Michigan, with capitalization $500,000, shares $25 par. Is controlled through ownership of entire stock issue, by 6 mining companies, the Copper Range group holding 12,000 shares and the Stanton companies 8,000 shares, holdings in shares being as follows: Champion, 4,400 shares; Trimountain, 4,400; Baltic, 3,200; Mohawk, 3,200; Wolverine, 3,200; Atlantic, 1,600. No dividends have been paid, profits being turned back into improvements.

Property is a reduction plant, 3 miles west of Houghton, near the old Atlantic stamp-mill, with frontage on Portage Lake. It was designed by Frank Klepetko and is the largest and most modern smelter in the Lake Superior district, with capacity of 90,000,000 lbs. fine copper yearly.

The plant is terraced throughout, permitting economical and largely automatic handling of material. The terraces for the different structures are sand-graded, with stone retaining walls. Mineral is delivered to the works in 40-ton bottom-dumping steel cars, by the Copper Range railroad, which also hauls away the refined copper, for shipment from the Copper Range wharves, in Houghton.

The 3,000-ton mineral storage bins, holding ten days' supply for the works, are located on the upper terrace. Mineral is dehydrated in rotary dryers, by waste gases from the furnaces, taken to the furnaces in tram-cars and dumped into hoppers on the charging floor. Coal-trestles, on an upper plateau, hold 15,000 tons of hard and soft coal, with separate storage compartments for charcoal, sand and limestone. Tunnels under the coal-trestle lead to the boiler-rooms and furnaces, fuel being delivered in tram-cars, loaded cars descending by gravity.

The 160x205′ reverberatory furnace building, of steel and brick, with

truss roof, and two 5-ton traveling cranes, has 6 furnaces, 2 being 16x36′ each, two 14x23′ each, one 15x18′, and one 16x40′, of 100 tons daily capacity. The two 16x36′ furnaces were built 18x50′, over all, but gave so much trouble that they were cut down to 40′ length.

Alternating with the larger reverberatories are one 300-h. p. and two 500-h. p. Stirling water-tube boilers, heated by waste gases from the furnaces. After leaving the boilers the waste gases are drawn through a 6x8′ subterranean flue, with arched roof, up the hill to a 150′ smokestack with base 100′ above the furnace building.

From the reverberatories molten copper goes to 2 blast furnaces, on a lower level to the north, where blister copper is cast mechanically, in moulds, upon a circular table, cooled in water and carried by a link-elevator to the loading platform. The cupola building is 40x70′, of steel and brick, with two floors. Slags are carried mechanically to the sampling mill, and reduced in a 30-ton crusher of 1,000 tons daily capacity, for resmelting. The waste slags from the final fusion are granulated by jets of water, and discharged through launders, to low ground northward, for grading.

The combination machine-shop and power-house, of steel and brick, has a complete equipment of shop tools, driven by an independent engine, and a 500-h. p. Nordberg horizontal tandem-compound engine driving a 200-kw. generator actuates the rotary blowers for the blast-furnaces. Electric power is used extensively, for operating the drying plant, cranes, casting machinery and lighting, and actuates 3 specially designed Jeffrey electric locomotives, of 100-ton draw-bar pull, taking current from overhead trolleys and hauling 8 pressed steel Sheffield mineral and coal cars, tracks reaching practically every part of the plant.

Miscellaneous buildings include a combination two-story and basement office and laboratory, of brick, heated by exhaust steam, also a 40x60′ iron-sheathed frame warehouse, barn, etc. The plant has two 50′ track-scales, of 150 tons capacity each, one for mineral and one for coal and flux, with smaller scales at other points. Water is obtained from the old Atlantic dam, on Cole's creek, through a 4,300′ flume, with capacity of 5,000 gallons per minute, leading to a 50,000-gallon water-storage tank, located 100′ above the works, giving good pressure at all points.

The works are treating the mineral of six mines, each of which is smelted separately, and are turning out circa 5,500,000 lbs. of refined copper monthly. The sixth reverberatory will give a monthly capacity of 10,000,000 lbs. fine copper, providing for growth of the mines for some years to come. In August, 1907, these works broke a world's record for casting from a single furnace, by turning out a charge containing 375,000 lbs. fine copper. This work was done by a crew of ten men, of whom 5 attended the furnace, and one operated the casting machine, while 4 men were required to inspect, sort and load the ingots in cars.

The Michigan smelter is well planned and well handled, the results secured being creditable alike to the designer and the management.

MICHIZONA DEVELOPMENT CO. **ARIZONA.**

Dead. Option surrendered and company wound up, 1905. Formerly at Pearce, Cochise Co., Ariz. Described Vol. V.

COMPAÑIA METALURGICA DE MICHOACÁN. **MEXICO.**

Works office: Ocampo, Zitácuaro, Michoacán, Mex. O. F. Westlund, manager; C. W. Carpenter and F. M. Flynn, superintendents. Property is a 10-year lease on the reduction plant of the Michoacán Mining & Railway Co., Ltd. Smelter, known as Los Trojes, rated at 250 tons daily capacity, has a 44x163″ water-jacket blast *furnace and 8 Baker* blowers, burning coke and *charcoal in equal quantities, charcoal being* made from the company's own

timber. Power plant includes two 4′ Pelton water wheels, operated under a head of 450′, and a small electric plant, with a 150-h. p. auxiliary steam plant. Idle, with indifferent prospects of resumption.

MICHOACÁN RAILWAY & MINING CO., LTD. MEXICO.

Office: 2 Suffolk Lane, Cannon St., London, E. C., Eng. Mine office: Angangueo, Michoacán, Mex. Henry W. Foster, M. P., chairman; G. A. Mitchell, secretary; Jas. W. Malcolmson, consulting engineer. Organized Jan. 29, 1889, under laws of Great Britain, with capitalization £105,364, shares $1 par, in £21,015 A cumulative 7% preference shares, £12,190 B non-cumulative 7% preference shares, £70,745 ordinary shares and £1,414 founders' shares; issued, £99,370. Debentures, £27,090, in a 4% prior lien, and £103,000 in 4% mortgage bonds. Railway rights originally held have been disposed of, remaining property being sundry mines and mineral lands, leased, 1906, to Compañía Metalurgica de Angangueo for 10 years.

MICHOACÁN SAN FRANCISCO COPPER MINES SYNDICATE, LTD. MEXICO.

Dead. Voluntarily liquidated, March, 1902. Formerly in Michoacán, Mexico.

MICULICICH i VALENTINE. PERÚ.

Mine office: San Tadeo, Yauli, Junin, Perú. Lands, 2 pertenencias, known as the Mina Gertrudis, opened 1897, having a vein with strike of N. 51° E. and nearly vertical dip, of about 2 meters width, with paystreak of 60 centimeters to 1 meter, carrying ore averaging 14% copper and 1,000 grams silver per metric ton, balance of vein carrying circa 5% copper and 300 grams silver per metric ton. Production, 1904, was 2,455 metric tons of ore averaging 14% in tenor, yielding 757,950 lbs. fine copper. Employs circa 50 men.

MIDDLEMARCH COPPER CO. ARIZONA.

Office: 212 Henne Bldg., Los Angeles, Cal. Mine office: Middlemarch, Cochise Co., Ariz. H. Bert Ellis, president; M. M. O'Gorman, vice-president and general manager; Wm. Le Moyne Wills, secretary; preceding officers, Richard Gird, Wm. King Gird and F. S. Austin, directors; Broadway Bank & Trust Co., Los Angeles, treasurer; Edw. K. Kelly, mine superintendent.

Organized Apr. 26, 1907, under laws of California, with capitalization $1,000,000, shares $1 par; increased, March 28, 1906, to $3,000,000, shares $100 par. Annual meeting, first Monday in April.

Lands, 68 claims, area 1,360 acres, in the Dragoon Mountains, showing 6 practically parallel contact deposits, between limestone and granite-porphyry, having a generally northwesterly strike, with dip of 42° to 54°. Two ore bodies under development, of 30′ to 80′ width, show oxidized ores, succeeded by sulphides, mainly chalcopyrite, with some chalcocite.

Development is by shafts of 210′, 248′, 100′, 165′, 65′, 50′, 120′, 90′ and 40′, and by tunnels of 625′, 150′, 367′, 450′, 390′ and 170′, giving about 2 miles of workings, estimated by company to show 200,000 tons of ore, with 100,000 tons blocked out for stoping in the Missouri mine, with ore in other properties, but not extensively developed. The ores of the Missouri are base at depth, and deficient in iron and lime, while not sufficiently pyritic to concentrate well.

Equipment includes a 300-h. p. steam plant, 50-h. p. hoist and 4-drill Laidlaw air-compressor. There are 12 buildings, including a 30x38′ engine-house, 32x38′ boiler-house, 30x38′ machine shop and 20x30′ smithy.

The reduction plant includes a concentrator and smelter under one roof, 40x100′ in size. The concentrator has an 8x12″ Blake crusher, 2 Huntington mills, 2 rolls, 2 Bartlett tables, 1 slime table and 3 sizers. The concentrator, of 40 to 60 tons rated daily capacity, receives ore by tram from the mouth

the Missouri tunnel, 300' distant. When operated the smelter made matte eraging 55 to 70% copper, 20 to 100 oz. silver and 0.25 to 2 oz. gold per ton. The company plans development of sulphide ores in the lower levels, and ection of a larger smelter. Property considered promising.

IDDLE RANGE MINING CO. **MICHIGAN.**

Office and mine: care of Thos. L. Chadbourne, president, Houghton, Hough- n Co., Mich. Capitalization $500,000, shares $25 par. Idle since circa 1895.

IDDLE SWANSEA MINING CO. **UTAH.**

Mine office: Eureka, Juab Co., Utah. Richard B. Shepard, president; E. Shepard, secretary and treasurer; preceding officers, Dana T. Smith, Harri- n O. Shepard and John M. Condon, directors. Lands adjoin the Eureka- ransea Extension. Presumably idle.

IDLAND GOLD & COPPER MINING & REDUCTION CO. **UTAH.**

Office and mine: Hot Springs, Box Elder Co., Utah. Geo. B. Dean, presi- nt; F. J. Hirt, vice-president; Albert Swingewood, secretary and treasurer; aniel Convery, manager. Organized 1904, with capitalization $1,000,000, ares $1 par. Lands, 14 claims, 2 miles from Hot Springs, in the Sierra adre district. Idle several years.

ID MOONTA COPPER MINES, LTD. **AUSTRALIA.**

Dead. Reconstructed, Oct. 29, 1901, as Moonta Central Copper Co., Ltd. rmerly at Moonta, Daly Co., South Australia.

IEDNOROUDIANSK MINE. **RUSSIA.**

Described under title Rudianski mines.

IEDZIANKA MINE. **AUSTRIA.**

Office: Kielce-Checiny, Galicia, Austria. Laszczynski Brothers, owners. he property is an old mine, circa 55 miles north of Cracow, abandoned for early a century, until taken over by the present owners. The mine shows a elt of cupriferous limestone, of about 150' width, traceable for 1¼ miles, eported to carry copper ore in streaks of ½" to 1" thickness only, ore being ainly chalcocite, with some azurite and malachite, having a gangue of calcspar nd quartz, ranging 15 to 45% in copper tenor. The property has been proven o a depth of 150'.

On reaching surface, ore is hand-picked, crushed by rolls and moulded nto blocks, with 5% of clay for a binder, bricks being dried by waste heat rom the furnace, and partially roasted in a kiln.

The reduction plant is of an experimental nature, and of small capacity nly. Roasted ore is crushed fine and leached in lead-lined tanks with spent iquor from the electrolytic baths containing about 5% of free sulphuric acid, iving, as a product, a liquor containing about 5% copper and 1% free acid. his is put through a filter-press, then goes to electrolytic tanks having in- oluble anodes of lead plates, in cloth bags, with thin copper cathodes. Cur- ent is 1,000 amperes, at 2.5 volts, giving a current density of 1 ampere per quare decimeter of cathode surface. Deposition of copper is about 1.1 gram er ampere-hour, nearly equal to the theoretical deposit, and power consumed, er kilogram of copper deposited, is 2.48-kw.-hours. Liquor is exhausted in bout 36 hours, when it is returned to extraction baths, for treatment of fresh re. Cathodes remain in the bath for about one month, when the deposit be- omes 1" to 1¼" thick. Product is said to be of greater purity than ordinary lectrolytic copper. The process is simple, and requires but a single trained orkman for its operation.

IHARA MINE. **JAPAN.**

Office: Mihara-mura, Chitsuki-gori, Bitchu, Japan. Production was 36,266 lbs. fine copper in 1903, and 293,045 lbs. in 1906.

ILAN MINING & MILLING CO. **NEW HAMPSHIRE.**

Office: 120 Exchange St., Portland, Me. Mine office: West Milan, Coos

Co., N. H. Employs circa 35 men. J. B. Carper, president and general m ager; R. C. Bradford, secretary and treasurer. Organized August, 1906, u laws of Maine, with capitalization $125,000, shares $100 par. Reported, 21, 1908, having $100,000 cash on hand.

Lands, 240 acres, freehold, also 140 acres timber lands. Mineral l show serpentine, with fissure veins in schist, carrying chalcopyrite associ with pyrite, there being 2 veins under development, these averaging a 20′ width, with northwest and southeast strike, giving average assay about 3% copper, 5% zinc, 1 to 3 oz. silver and 44% sulphur. Has shaft 40′ and 260′, and 4 short tunnels, with about one-half mile of undergr openings, estimated to show 200,000 tons of ore, with 25,000 tons blocked for stoping. Work was begun by present company August, 1906.

Equipment includes a 150-h. p. steam plant, with 35-h. p. hoist, 4- air-compressor, machine shop, carpenter shop, crusher house, several dwell etc., with total of 11 buildings. Has a 40x60′ wooden concentrator buil with one jaw-crusher and 4 Wilfley tables. Is served by the Grand T railroad, ¼ mile from the shaft, connected by siding. Production, 1906, about 11,000 tons of pyrites and 100 tons of 20% copper ore, produced a average cost of about $1.50 per ton. Company plans installation of new chinery in mill and adding 6 Wedge furnaces, with chlorination works.

MILFORD COPPER MINING & SMELTING CO. UT

Office: 5 Walker Bank Bldg., Salt Lake City, Utah. Mine office: ford, Beaver Co., Utah. Geo. H. Dern, president; Chas. E. Hudson, secre and treasurer; Frank H. Lathrap, general manager. Organized 1902, u laws of Utah, with capitalization $300,000, shares $1 par. Lands, 11 cl area 220 acres, near the O. K. mine of the Majestic. Idle and appar moribund.

MILFORD GOLD & COPPER MINING CO. UT

Mine office: Milford, Beaver Co., Utah. Long idle and apparently bund.

MILLER MINING CO. MEX

Dead. Was succeeded, circa August, 1908, by Kansas-Cananea Copper Formerly at La Cananea, Arizpe, Sonora, Mex.

MILLER MINING, MILLING & SMELTING CO. UT

Mine office: American Fork, Utah Co., Utah. Russell Benedict, presi Property, in American Fork Cañon, formerly was leased, but work wa sumed by company circa July, 1908.

CHAS. S. MILLS & CO. MEX

Office and mine: Hocasitas, Ures, Sonora, Mex. Chas. S. Mills, ge manager. Lands, 103 hectares, known as La Colorada group, also a 6-he millsite, showing 5 veins, ranging 2′ to 100′ in width, occurring as fis in porphyry and as contacts between porphyry and phonolite, carrying silver, copper, nickel, cobalt and platinum. Mine has a 100′ shaft and a tunnel, steam power and a 20-ton stamp-mill and concentrator. Nearest road, 25 miles, is the Sonora branch of the Southern Pacific. Idle since

MILTON COPPER CO. MICHI

Dead. Wound up 1902. Formerly at Victoria, Ontonagon Co., Mich. scribed Vol. II.

MILWAUKEE-MONTANA NATURAL BRIDGE GOLD & COPPER MINING CO. MONTA

Dead. Was promoted by C. T. McElroy. Formerly at Contact, Park Mont.

MILWAUKEE & NEW MEXICO MINING CO. NEW MEX

Office: 97 Wisconsin St., Milwaukee, Wis. Mine office: Tres Pie

Taos Co., N. M. J. D. Draught, secretary and treasurer. Property is known as the Sardine group. Presumably idle.

MILWAUKEE-PALMER MOUNTAIN GOLD & COPPER MINING CO. **WASHINGTON.**

Dead. Formerly at Loomis, Okanogan Co., Wash.

MINDOULI MINE. **FRENCH CONGO.**

Mine office: Comba, via Brazzaville, French Congo. Lands, in the Kouilou-Niari basin, circa 300 kilometers from the coast, show cupriferous sandstone overlying limestone, surface ores being mainly malachite, with some cuprite, both argentiferous. These deposits were worked by the natives, in a primitive way, for centuries, and a considerable trade once existed in copper and copper utensils, but this became extinct with French occupation. Mine probably is unworkable under modern conditions without railroad transportation, now lacking.

MINE DEVELOPMENT ASSOCIATION. **NEW MEXICO.**

Mine office: Socorro, Socorro Co., N. M. W. H. Bullard, president; H. L. True, secretary; Cony T. Brown, manager. Property includes the Stonewall Jackson mine, carrying zinc-lead ores, also sundry copper-zinc-lead lands.

COMPAÑIA MINERA DE MINAS NUEVAS. **MEXICO.**

Mine office: Alamos, Sonora, Mex. Has auriferous and argentiferous copper ore, with steam power, employing circa 30 men at last accounts.

MINERAL CREEK COPPER CO. **ARIZONA.**

Dead. Formerly at Globe, Gila Co., Ariz.

MINERAL CREEK MINES CO. **ARIZONA.**

Letter returned unclaimed from former office and mine, Globe, Gila Co., Ariz. A. J. Kaltenbach, president; E. E. Kaltenbach, vice-president; Harold E. Bierce, secretary and treasurer. Organized 1907, under laws of Arizona, with capitalization $250,000, shares $10 par.

MINERAL CREEK MINING CO. **ARIZONA.**

Dead. Operated circa 1881. Formerly at Red Rock, Pinal Co., Ariz.

MINERAL CREEK MINING & SMELTING CO. **WASHINGTON.**

Office: 515 California Bldg., Tacoma, Wash. Mine office: Mineral, Lewis Co., Wash. Adrian F. Kirkpatrick, president; Chas. H. Little, secretary. Organized June 14, 1901, under laws of Washington, with capitalization $2,000,000. Ores carry gold, silver, lead and copper. Has water power and a 20-ton smelter. Idle several years.

MINERAL FARM MINING CO. **IDAHO.**

Office: Spokane, Wash. Mine office: Mullan, Shoshone Co., Idaho. Daniel McQuarrie, president; M. J. McHugh, vice-president; Irvin D. Whitmore, secretary and treasurer; Louis C. Jaquish, manager; preceding officers, E. G. Ellis, D. R. Beck and M. Robert Weidner, directors. Lands, 11 claims, 8 patented, circa 1½ miles from Mullan, showing a fissure vein of 100′ reported average width, opened by 3 tunnels, No. 3 being 115′ long.

MINERAL HILL CONSOLIDATED COPPER CO. **ARIZONA.**

Office: 331 Fourth Ave., Pittsburg, Pa. Mine office: Tucson, Pima Co., Ariz. M. S. Isherwood, president; Boon Ingells, vice-president; E. B. Reeser, secretary, treasurer and superintendent; E. N. Ray, general manager. Organized March, 1904, under laws of Arizona, with capitalization $3,000,000, shares $1 par, as successor of Azurite Copper & Gold Mining Co.

Lands, 26 claims, 12 patented, area 520 acres, in the San Xavier district, 18 miles southwest of Tucson, including the Azurite group of 13 claims, said to have produced $550,000 worth of ore under former ownership, the American group of 8 claims, and the Mineral Hill group of 5 claims. The mine is said to show a large body of sulphide ore, of concentrating grade, averaging about 3.5% copper.

Development is by 74 pits and open-cuts, 8 tunnels, mostly short, longest being 250′, and 48 shafts, mostly shallow, 5 deepest being 130′, 125′, 150′, 345′ and 200′, mine having a total of circa one mile of workings, claimed to have blocked out, in the lower levels, 100,000 tons of 5% sulphide ore, which figures are considered unduly high.

The property is said to have a 150-h. p. steam plant, with hoists good for 350′ and 2,000′.

There is an antiquated smelter having a 30-ton water-jacket blast-furnace which is of no present value, and the company was said, April, 1908, to have contracted for a 100-ton concentrator, but in 1907 it was stated that a 500-ton smelter had been ordered, this not proving true. It was claimed, by its agents, who made some exaggerated statements, that the cost of mining and transportation to smelter was $4.50 per ton. In 1907 the mine shipped circa 2,500 tons of selected ore, of circa 3.5% copper tenor, to the Douglas smelter yielding 169,538 lbs. fine copper and 1,478 oz. silver. Property is considered promising, though ore is low in grade.

MINERAL HILL COPPER & GOLD MINING CO. ARIZONA

Mine office: Tucson, Pima Co., Ariz. Lands, 36 claims, having circa 1,000′ of workings, showing auriferous and argentiferous lead and copper ores.

MINERAL HILL COPPER SYNDICATE, LTD. ARIZONA

Dead. Formerly at Huron, Yavapai Co., Ariz.

MINERAL HILL MINING CO. WASHINGTON

Offices: 49 West 125th St., New York, N. Y. Mine office: Conconully, Okanogan Co., Wash. Dr. Jacob May, president; A. R. Lacey, secretary; E. P. Wheeler, superintendent. Lands, 20 claims, having a 1,800′ tunnel said to cut 3 veins carrying argentiferous copper and lead ores, mainly argentiferous tetrahedrite. Has steam power, ore bunkers with crusher and a saw-mill with an available waterfall, rated at circa 4,000-h. p. It was expected, early 1907, that company would be merged in the Washington Consolidated Copper Co. Idle at last accounts.

MINERAL HILL MINING & SMELTING CO. CALIFORNIA

Letter returned unclaimed from former office, 237 Twelfth St., San Francisco, Cal. Mine office: Spenceville, Nevada Co., Cal. C. C. Bitner, manager. Lands, 5 claims, opened by a 535′ tunnel showing gold-copper ore. Has water power. Idle.

MINERAL HILL TUNNEL & COPPER MINING CO. WASHINGTON

Office: 1140 Old South Bldg., Boston, Mass. Mine office: Danville, Ferry Co., Wash. Albert Vittum, president. Organized 1906, with capitalization $1,500,000, shares $1 par, as successor of Minnehaha Copper-Gold Mining Co. Is controlled, through ownership of majority of stock, by Boston Consolidated Mining Co.

Lands, 8 groups, lying at average distance of circa 2 miles south of the international boundary line, in the Wannicutt Lake district of Okanogan county, Washington, and in Ferry county, Washington. The Minnehaha group, 4 claims, area 70 acres, has several shafts, deepest 250′, and a 200′ tunnel, showing a vein of low grade auriferous copper ore with a 12″ pay streak of ore of good tenor. Shipped some ore, December, 1904, to the Granby smelter, that gave net returns of circa $250 to $400 per car.

MINERAL MINING CO. OREGON

Mine office: Huntington, Baker Co., Ore. Has a tunnel, showing copper ore, also a small smelter. Idle.

MINERAL MINING & SMELTING CO. NEVADA

Office: Reno, Nev. Mine office: Palisade, Eureka Co., Nev. Lands, *sundry claims*, on Mineral Hill, midway between Eureka and Palisade, said *to show* a 16′ vein, carrying auriferous and argentiferous copper and lead

es, giving assays up to $1,108 per ton in gold. Is said to have started a 60-ton elter. Idle.

INERAL MOUNTAIN MINING CO. **ARIZONA.**

Dead. Operated circa 1902. Formerly at Calabasas, Santa Cruz Co., Ariz.

INERAL MOUNTAIN MINING CO., LTD. **NEW MEXICO.**

Mine office: Steins, Grant Co., N. M. Has argentiferous lead and copper s. Idle several years and apparently moribund.

INERAL POINT MINING CO. **COLORADO.**

Mine office: Marble, Gunnison Co., Colo. Lands include the Carbonate oup, carrying auriferous and argentiferous copper ore. Has gasoline power d a 50-ton smelter. Presumably idle.

INERAL POINT MINING CO. **IDAHO.**

Mine office: Osburn, Shoshone Co., Idaho. S. V. Osburn, manager. nds, south of Osburn, adjoining the Marie, have 2 tunnels, lower showing 12" vein of tetrahedrite.

INERS COPPER CO. **MICHIGAN.**

Dead. Merged, March, 1899, in Isle Royale Copper Co. Formerly at oughton, Houghton Co., Mich.

INERS' SMELTING CO. **UTAH.**

Letter returned unclaimed from former office, 42 Broadway, New York, Y. Works office: Garfield, Salt Lake Co., Utah. Organized July, 1907, der laws of Maine, with capitalization $10,000,000. Property is a smelter- te, well located, at Lake Point, circa 2 miles west of Garfield Beach, on the uthern end of Great Salt Lake, on which it was planned, early 1908, build- g a 3,000-ton smelter, at an estimated cost of $2,000,000. Company is said have a 10-year contract for smelting the ores of the Silver King Coalition.

INES DEVELOPMENT CO. OF NEVADA. **NEVADA.**

Office and mine: Lovelock, Humboldt Co., Nev. John T. Reid, president, easurer and general manager; Patrick K. Reid, vice-president; Paul G. Reid, cretary and superintendent; preceding officers, Emmet E. Reid, R. C. Moore, Thies, Peter Ancher, E. B. Loring and John O'Kane, directors. Organized ept. 1, 1904, under laws of Arizona, with capitalization $750,000, shares $1 ar; issued, $300,000.

Lands, 5 claims, area 100 acres, in the Juniper Mountain district, show- g various fissure veins, of which 2, of about 4' average width, under de- lopment, show chalcocite, bornite and tetrahedrite, giving average assays f 2% copper, 11 oz. silver and $3.50 gold per ton. Development is by a 30' haft and a 185' tunnel. Is practically idle, except for annual assessment ork, but company plans resumption on a considerable scale.

INESOTA MINING CO. **MICHIGAN.**

Dead. Lands now owned by Michigan Copper Mining Co. Paid large ividends. Formerly at Rockland, Ontonagon Co., Mich. Very fully de- cribed, under title Michigan Copper Mining Co., Vol. II.

INES VENTURE SYNDICATE. **CALIFORNIA & OREGON.**

Office: 327 Pacific Electric Bldg., Los Angeles, Cal. E. Shirley Wilson, resident; J. Munroe Layman, general manager. Organized under laws of rizona, with capitalization $2,000,000, shares $1 par. Lands are sundry un- eveloped copper claims in Modoc county, California, and Lake county, Oregon.

INGINEW COPPER SYNDICATE, LTD. **AUSTRALIA.**

Dead. Formerly at Mingenew, Western Australia.

INGUS MOUNTAIN COPPER CO., LTD. **ARIZONA.**

Office: 516 Grant Bldg., Los Angeles, Cal. Mine office: Jerome, Yavapai o., Ariz. R. A. Thomas, president; Thos. E. Metcalf, vice-president; W. W. Thomas, second vice-president; J. R. Thomas, secretary and treasurer; A. M. McDermott, assistant secretary; *preceding officers*, W. B. Simmons and W. B.

Metcalf, directors; Thomas Brothers & Metcalf, managers. Organized March, 1900, under laws of Arizona, with capitalization $3,000,000, shares $1 par; issued, $2,350,000.

Lands, 38 claims, area 750 acres, fairly timbered and watered, in the Black Hills district, 12 miles south of Jerome, the nearest railroad point, showing 3 fissure veins carrying oxide and sulphide ores, one vein, having a claimed extreme width of 40′ and said to be traceable 4,000′, giving good surface showings of carbonate ores, assaying up to 16% copper. Development is by shafts of 120′, 250′ and 370′, with several tunnels, giving a total of 3,670′ of workings. Company estimates average tenor of ore at 8% copper, with small gold and silver values, which is thought too high.

Equipment includes a 50-h. p. steam plant, with 2 hoists good for 1,000′ each, and several mine buildings. Company is out of cash and apparently in a bad way.

MINING EXPLORATION CO., LTD. **ARGENTINA.**

Office: 19 New Union St., London, E. C., Eng. Operating office: 1128 Agustinas, Santiago de Chile. Works office: Tinguiririca, Chile. Col. Sir Thos. Hungerford Holdich, K. C. M. G., chairman; Wm. Rich, consulting engineer; Frank Lumley, general manager; F. A. Bagnell, secretary. Organized Sept. 29, 1900, under laws of Great Britain, with capitalization £175,000, shares £1 par; issued, £205,000.

Lands include La Victoria and Las Choicas mines, which are in Argentina, circa 60 miles from Tinguiririca, Chile, which is the nearest rail point, and, although lands are in Argentina, operations, to all practical effect, are in Chile. Las Choicas mine, on the eastern slope of the Andes, shows considerable rich ore carrying high values in both silver and copper, and was estimated, 1908, to have in sight 100,000 long tons of ore averaging 8% copper and 50 oz. silver per ton, which figures are considered high. Development is mainly by tunnels.

The reduction plant, on the Rio Tinguiririca, has water power available for development. Company ordered, 1907, material for a 53-kilometer railway, of 60-cm. gauge, from the Choicas mine to the reduction works, which include a 100-ton mill and smelter, expected to begin smelting late in 1908. A wagon-road for traction engines has been built from Tinguiririca to the mine. Property is considered promising.

MINNEAPOLIS COPPER CO. **MEXICO**

Mine office: 550 Security Bank Bldg., Minneapolis, Minn. J. W. Christy, general manager; Tom. L. West, resident manager. Lands are near the Bele and Transvaal mines. Has gasoline power. Was developing, 1908, with a small force.

MINNEAPOLIS COPPER MINING & MILLING CO. **WYOMING & MONTANA**

Dead. Formerly at Boulder, Jefferson Co., Mont., and Encampment, Carbon Co., Wyo.

MINNEHAHA COPPER-GOLD MINING CO. **WASHINGTON**

Dead. Absorbed, 1906, by Mineral Hill Tunnel & Copper Mining Co. Formerly at Danville, Ferry Co., Wash. Described Vol. VI.

MINA MINNIE. **CHILE**

Mine office: Higuera, La Serena, Coquimbo, Chile. T. H. Everitt, Juan Bade and J. Aldai, owners and managers. Lands, 1 pertenencia, area 3 hectares, circa 13 miles north of Higuera, showing a vein of 10′ width at surface, producing carbonate ore of 10% average tenor. Mine is opened by 2 adit levels, and ore is sold to Sociedad Minera San Juan. Employs 16 men.

INNIE GULCH MINING & TUNNEL CO. **COLORADO.**

Mine office: Silverton, San Juan Co., Colo. Ores carry gold, silver and pper. Has steam power. Idle several years.

INNIE HEALY MINING CO. **MONTANA.**

Dead. Property sold, 1906, to Butte Coalition Mining Co. Formerly at tte, Silver Bow Co., Mont.

INNIE MABEL GOLD & COPPER MINING CO. **WYOMING.**

Dead. Formerly at Rambler, Carbon Co., Wyo.

INNIE MINING & MILLING CO. **UTAH.**

Mine office: Bingham Canyon, Salt Lake Co., Utah. Long idle and pre-mably out of business.

INONG MINING CO. **MICHIGAN.**

Dead. Was the most important copper mine on Isle Royale, having made 8,650 lbs. fine copper. Formerly on Isle Royale, Mich. Described Vol. II.

INONG RANGE COPPER CO. **WISCONSIN.**

Dead. Succeeded, 1906, by Rudolph Land Co. Formerly at Gordon, ouglas Co., Wis. Fully described Vol. III.

INT GROUP. **WASHINGTON.**

Office: care of D. F. Strobeck, owner, Spokane, Wash. Mine office: leyers Falls, Stevens Co., Wash. Lands, on Gold Hill, show 3 veins, of 8' to 5' width, giving assays up to 8% copper, 5 oz. silver and $8 gold per ton. Idle veral years.

IRANDA HERMANOS. **PERÚ.**

Office and mine: Cajamarca Cajamarca, Perú. Mine, known as the legritos, carries rich argentiferous copper ore, and is reputed to be highly rofitable.

ISKWABIK DEVELOPMENT ASSOCIATION, LTD. **MICHIGAN.**

Dead. Lands sold, March, 1907, to Ojibway Mining Co. Formerly at hoenix, Keweenaw Co., Mich. Described Vol. VI.

ISSIZONA GOLD & COPPER CO. **NEVADA.**

Mine office: Las Vegas, Lincoln Co., Nev. D. F. Watson, manager. ands are on the Colorado River, near the Sears mine.

ISSOULA & COEUR D'ALENE COPPER CO. **IDAHO.**

Letter returned unclaimed from former mine office, Murray, Shoshone o., Idaho. Property, on the old Murray trail, known as the Cook & Barnes roup, has a 600' tunnel with a 480' back, showing a fissure vein, apparently f fair width, carrying copper ore.

ISSOULA COPPER MINING CO. **IDAHO.**

Mine office: Mullan, Shoshone Co., Idaho. Robert R. McCormick, presi-ent and general manager; Thos. G. Kennedy, secretary and treasurer; J. A. ushnell, superintendent. Capitalization increased, 1907, from $100,000 to 1,500,000, shares $1 par. Lands, 20 claims, 2 fractional, in Deadman's Cañon, miles east of Mullan. Has 2 tunnels, longest 1,000', and is continuing the ndependent tunnel 700' into Missoula ground, to open a wide ledge of quartz-te showing occasional stringers of high-grade copper carbonates. Has secured res assaying up to 30% copper. Has electric power and an 8-drill air-com-ressor.

ISSOURI & ARIZONA COPPER MINING CO. **ARIZONA.**

Office: 733 R. A. Long Bldg., Kansas City, Mo. Mine office: Mayer, avapai Co., Ariz. A. A. Whitney, president; B. A. Stiles, vice-president; B. . Stevenson, secretary; E. C. Cooper, treasurer. Organized 1907, under laws f Arizona, with capitalization $1,000,000, shares $1 par. Lands, 5 claims, area 00 acres, in the Big Bug district, claimed to have a shaft showing sulphides assaying 4.5% copper and $2 gold per ton, with a trace of silver. Is not re-garded favorably.

MISSOURI COPPER CO. MISSOU

Dead. Formerly had an office, circa 1903, at 50 State St., Boston, Mass.

MISSOURI COPPER MOUNTAIN MINING CO. MISSOU

Office: 323 West 7th St., Sedalia, Mo. Mine office: Sullivan, Crawfo Co., Mo. L. M. Barnard, president; W. H. H. Myers, secretary. Capitalizati $1,000,000, shares $100 par. Lands, 74 acres freehold and 690 acres leasehe Mine, worked in a small way, before 1850, has 4 shafts and tunnels of 240' a 1,000', showing carbonate ores, with hematite gangue and heavy clay gou claimed to average about 10% copper. Has steam power and concentra with a Blake crusher, 18" and 22" rolls, 4 New Century jigs, Card concentr ing table and hydraulic classifiers. Smelter has a 40-ton Allis-Chalmers wat jacket furnace, with Root blower. Country rock is magnesian limestone, body having a good gossan capping, with vein showing chalcopyrite and pyr in the sulphide zone. Idle several years and apparently moribund.

MISSOURI & MEXICAN MINING CO. MEXI

Office: Dwight Bldg., Kansas City, Mo. Mine office: Suaqui de Bat Ures, Sonora, Mex. Geo. A. Wittig, president; Leo N. Leslie, secretary. La 370 acres, on the Yaqui River, 9 miles northwest of Suaqui de Batuc, circa 100 miles from a railroad, said to show ore carrying values of $60 $300 per ton. Idle several years and apparently moribund.

MITCHELL COPPER MINING CO. MONTA

Letters returned unclaimed from former office, Missoula, Mont., and fr former mine office, Florence, Ravalli Co., Mont. Organized July, 1907, un laws of Montana, with capitalization $1,000,000.

MITCHELL DEVELOPMENT CO. ARIZO

Dead. Liquidated, 1906. Formerly at Bisbee, Cochise Co., Ariz. F described Vols. IV and V.

MITCHELL MINING CO. MEXI

Office: 52 Wall St., New York, N. Y. Mine office: Chilpancingo, Bra Guerrero, Mex. John A. I. Cassidy, president; Thos. H. Anderson, vice-pr dent; Wm. F. Fluhrer, treasurer; preceding officers, Samuel V. Woodw Martin F. Morris, B. F. Cole, Robt. E. Morrison, Geo. W. Burleigh and Ph S. Dyer, directors; J. McD. Mellen, secretary; E. D. Elson, general manag E. E. Noon, mine superintendent.

Organized Apr. 16, 1902, under laws of Arizona, with capitalizat $5,000,000, increased circa August, 1906, to $8,000,000, shares $10 par. H lands through La Dicha Mining & Smelting Co., S. A., organized under law Mexico. Controls, through ownership of stock, La Dicha & Pacific Railr Co., which has an issue of $1,000,000 bonds, at 6%, said to have been und written by large shareholders of the Mitchell, and guaranteed, both princi and interest, by the Mitchell Mining Co. Knickerbocker Trust Co., New Yo registrar. Annual meeting, first Monday in April.

A 5% dividend was declared, December, 1905, but this proved a promi dividend only, payable in bi-monthly installments of 1%, of which only first and second installments were paid, in January and March, 1906, the p text for passing further payments being the cost of enlarging the plant, Geo. Mitchell, promoter of the company, and its former president, is said have voted himself two years' back salary, at $25,000 per annum, just be quitting office.

Lands, 1,800 pertenencias, area 4,446 acres, in 7 groups, forming a pa lelogram of 1 by 7 miles, with axis of the tract along the strike of the v in the districts of Bravos and Tabares, circa 40 miles in an air-line from A pulco. There are also circa 18,000 acres of plantation lands, and 164,000 ac of virgin timber lands, including some good oak, yellow pine and hardwo The district is fertile and healthy, with an excellent climate, the temperat

; 74° F. El Rincon ranch, area 18,000 acres, is said to have 8,000
es, 16,000 cacao trees, pineapples, oranges, etc., besides raising veg-
id cereals, and grazing large herds of cattle and flocks of sheep, fur-
ll food supplies for the workmen at the mine.
ldition to the copper property, the Mexican lands of the company
eposits of coal and iron ore, also mineralized veins carrying gold and
es.
ipal mining property is La Dicha group, said to carry a con-
ein of sulphide ore upwards of 5 miles in length, continuity being
a heavy gossan capping, and by exposures where a series of mountain
ave cut the vein, at intervals of a quarter to a half mile, claimed
the ore body being 150′ to 225′, with a granite footwall and schistose
The vein is said to have been exposed to a depth of 745′ at one
a stream cutting through. Below the gossan, and above the base
tituting the great bulk of ore, is a layer of 1′ to 6′ of chalcocite,
ip to 74% copper tenor. The vein matter is essentially chalcopyrite,
l pyrrhotite.
Rio Alcaparosa parallels a considerable portion of La Dicha vein, re-
s affluents numerous smaller streams that have cut across the vein
imately right angles, wearing down new beds, sometimes for hun-
eet, affording perfect cross-sections of the ore body.
opment is by 8 shafts and 4 tunnels, with circa 3 miles of workings,
and tunnels being reported to be in ore. Principal developments
en shaft No. 1 and tunnel No. 8, a distance of circa 2,800′. Shafts
llowing depths: No. 1 is 65′; No. 2 is 151′; No. 3 is 130′; No. 4 is
5 is 74′; No. 6 is 690′; No. 7 is 338′; No. 8 is 470′; No. 9 is 640′; No.
No. 11 is 356′, and No. 12 is 308′. All shafts are of 2-compartment
ly timbered and equipped with temporary wooden shafthouses, iron-
Development is mainly by tunnels, of which Nos. 4, 6, 8 and 9 have
ts. At different times various officers of the company have claimed
to 18,000,000 tons of ore in sight, and former President Mitchell
o shareholders that the ores of the mine would average 6% copper.
, 1904, the company claimed to have 861,975 tons of ore blocked out
g, with 6,898,636 tons in sight. These figures were gross exaggera-
ugh the mine has large ore bodies, and the original claims of Presi-
hell that the ore would average 6% copper tenor were modified to
aim that the mine had 2,500,000 tons of ore blocked out averaging
, and 6,000,000 tons averaging better than 3.5% in copper tenor. In
nany past exaggerations these claims must be viewed with deep sus-

equipment is light, owing partially to the development of the mine
ls. The power plant includes two 40-h. p. and two 120-h. p. hoists, 2
compressors and 12 power drills.
lings include a general store and a considerable number of cabins for
. The supply of native labor is said to be ample, and fairly efficient,
nging from 29 cents to 42 cents, gold, per day.
Rio Papagalla, circa 3 miles from the southern end of the mine, has
ible head of 200′, if reached by a tunnel of about 1,000′ length, esti-
capable of developing 8,000 h. p. in the dry season, and there is a
horsepower available on the Rio Alcaparosa, for which it is claimed
50-h. p. installation was ordered, but it cannot be learned that this
ived. The management had a cheerful way of stating as facts things
ld have been facts, but were not.
smelter, located at a 75′ waterfall, has on Mitchell economic
furnace, *and it was claimed that a 300-* furnace of the same

make was being installed, March, 1906, but apparently the second fu failed to materialize. Blast is furnished by 3 Connersville blowers. Th verter plant, of 25 tons daily capacity, has one stand and 3 shells, an put in commission circa August, 1906. Fuel was coke, wood and charcoal

La Dicha & Pacific Railroad, planned to be 83 miles long, from the near Chilpancingo to Puerto Marquez, 10 miles south of Acapulco, has bee veyed, and it was claimed, early 1906, that contracts were let for gradin laying steel. Apparently work actually was begun May, 1906, but at la counts the first section of 30 miles was uncompleted, and none of the l operation.

Production, 1905, was estimated, 1906, by the Copper Handbook, at 3,0 lbs., with the statement that the estimate might be too high, which doubtedly was, as the company dealt consistently in exaggerations reg production, as well as all other features of operation. The company i to have shipped 201,000 lbs. of copper, 1906, via Panamá, which may o not have been true.

The company was said, 1906, to have given up the Point Vesuvius on Galena Bay, Prince William Sound, Alaska, but it is not certain that lands were held by the Mitchell Mining Co., as the boundaries separatin company from the other Mitchell promotions were very hazy.

The company formerly held the Schultz mine and adjoining prop near Globe, Gila county, Arizona, but threw up its bonds.

On June 13, 1908, Geo. Mitchell assigned, to the Mitchell Mining C company's note to him for $156,875.93, issued to cover alleged advances personally by Mitchell to La Dicha Mining & Smelting Co., S. A. Two ganization committees were appointed, 1907, and apparently these are p at cross purposes. Company's property was attached, October, 1908, by erick Cuthbertson, for $57,291. The company apparently is hopeless volved, and the miserable manner in which the property has been mana highly discreditable to Mitchell and all others connected with the pron The outcome fully verifies the criticisms of the Copper Handbook, m Vols. V, VI and VII.

MITSU BISHI GOSHI-KWAISHA. JA

Office: Mitsu Bishi Bldg., Yaesucho Itchome, Kojimachi-ku, Tokio, Branch office: 10 Aioicho, Itchome, Kobe, Japan. Mine offices are gi detailed mine descriptions following. K. Nambu, president; S. Harada president; S. Sho, secretary; R. Tayakawa, treasurer; A. Yamada, genera ager; K. Kimura, manager Kobe office.

The company is an extensive producer of copper, its principal mines the Yoshioka, Arawaka, Makamine, Ikuno, Sawatari, Omodani, Mozumi, and Sado, with various smaller properties.

The Osaruzawa mines are at Hanawa, Kazuno, Rikuchu, Japan. K hara, superintendent; K. Okamoto, smelter superintendent; W. Mats mine superintendent; K. Ikeda, mill superintendent; T. Kawamura, en Lands, circa 1,000 acres, also 200 acres of miscellaneous lands adjoining. are very ancient, having been opened in the Eighth Century, but were for gold only, until circa 1650, when copper ores were developed. mainly chalcopyrite, with occasional bornite and a little native copper ciated with pyrite and small quantities of sphalerite, galena and he Occasionally native gold is found, mixed with the copper ores, and in a fahlband, gold values occurring mainly in the upper workings. The ve very numerous, ranging from 5" to 30' in width, with average width The veins, which are very persistent in strike, and hold workable to an a depth of 500', traverse Tertiary shales and tuffs, with intrusive augite-a and liparite. Development is by 8 working shafts, deepest 470', and 7

, longest 7,500', the mines having upwards of 15 miles of workings. elter has two 40-ton water-jacket blast-furnaces and a 250-h. p. electric turning out blister copper of 99.09% tenor. The Osaruzawa mines circa 1,000 men, and, in 1,200 years of operation, have produced im- quantities of gold, silver and copper. Production was 2,448,000 lbs. per in 1902; 2,817,152 lbs. copper, 142,492 grams silver and 6,161 grams 1906, and 2,537,710 lbs. copper, 204,313 momme silver and 2,600 momme 1907.

Yoshioka mine is at Fukiya-mura, Kawadami-gori, Bitchu, Japan. ka, general superintendent. The mine, opened 1806, was worked con- , but never became a considerable producer until taken over, 1873, nt owners. The property was very difficult of access until a new road t by the Mitsu Bishi company. Ore is chalcopyrite, associated with e, pyrite and pyrrhotite, with quartz gangue, and averages, after 9% copper. Ore occurs in veins in country rocks of clayslate, sand- l schalkstein, traversed by porphyry dykes. Production was 1,081,346 copper and 1,722,000 momme silver in 1900; 1,674,648 lbs. fine copper 1,725 grams silver in 1906, and 1,809,679 lbs. fine copper, 461,170 ilver and 1,080 momme gold in 1907.

Arakawa mine is at Arakawa-mura, Senhoku-gori, Ugo, Japan. M. neral superintendent. This property, formerly known as the Ugaiwa reopened 1871, and, after passing through various hands, was bought, the present owners. Country rocks, of Tertiary and Quaternary ages, ornblende-andesite, liparite and propylite, carrying numerous parallel propylite, with strike approximately northeast and southwest. Pro- as been as follows: 566,268 lbs. fine copper in 1900; 1,200,215 lbs. in 1,645,921 lbs. in 1907.

Hisanichi mine is at Arakawa-mura, Senhoku-gori, Ugo, Japan. M. neral superintendent. This property, near the Arakawa, shows 6 main e largest, known as the Ugaisawa, of about 24' average width, carries of payable ore, and occasionally branches into several smaller veins. er workable veins range 5' to 7' in width. Ore is chiefly argentiferous rite, associated with pyrite, frequently carrying native copper, cuprite socolla, associated with pyrite, sphalerite and galena, with quartz The property has water and electric power, and a 50-ton smelter, g circa 1,200 men. Production, 1900, was 1,734,522 lbs. fine copper.

Ikuno mines are at Ikuno, Tajima, Japan. T. Hori, general manager. operties employ circa 1,000 men. Mines were discovered A. D. 807, extensively worked, 1596-1620, under the direction of the Tokugawa nt, but were taken over, 1868, by the Imperial government, and sold, the present owners. The three principal mines of this group are the nagase and Kasei. The Tasei mine has a main vein of 14' average ith numerous branches traversing liparite, propylite and Tertiary ying native gold, argentite, and silver, malachite, chalcopyrite, sphal- galena, associated with pyrite. The Kanagase mine, near the Tasei, ame country rocks, but is traversed by basalt dykes, a great fault- to 40' in width, filled with brecciated country rock, showing 6 veins native copper, bornite, chalcopyrite, tetrahedrite, argentite, sphalerite, yrargyrite and stibnite. The Kasei mine shows diorite, traversed by nd propylite dykes, the metalliferous veins, occurring in diorite, carry- opyrite and native silver, with ores of lead, zinc and antimony. The s have steam, water and electric power. Production of the Ikuno s been as follows: 984,355 lbs. fine copper, 1,260,932 momme silver momme gold in 1900; 1,435,234 lbs. fine copper in 1903; 1,845,091 copper, 6,368,010 grams silver and 131,794 grams gold in 1906;

1,979,789 lbs. fine copper, 1,499,664 momme silver and 22,596 momme gold in 1907.

The Makamine mine is at Kitakata-mura, Higashi-Usuki-gori, Hyuga, Japan. This property is an old mine, idle for many years, until reopened, circa 1896, by the Mitsu Bishi company. Ore is chalcopyrite, associated with pyrite, averaging 3.5 to 4% in copper tenor. The property has been modernized in equipment and methods. Production has been as follows: 1,208,282 lbs. fine copper in 1900; 1,933,227 lbs. in 1903; 1,275,097 lbs. in 1906; 1,179,212 lbs. in 1907.

The Omodani mine is at Kami-Anana-mura, Ono-gori, Echizen, Japan. This property, opened A. D. 1350, has numerous small veins, none exceeding 4' in width, carrying bornite, chalcopyrite, sphalerite and galena, all argentiferous and showing occasional native silver. Production has been as follows: 614,438 lbs. fine copper and 103,682 momme silver in 1900; 432,248 lbs. copper and 1,043,115 grams silver in 1906; 502,331 lbs. copper and 282,723 momme silver in 1907.

The Sawatari mine is at Kitakata-mura, Higashi-Usuki-gori, Hyuga, Japan. This property, adjoining the Hibira mine, carries small lenses of ore in Paleozoic clayslate and sandstone. Production was 137,191 lbs. fine copper in 1902 and 227,684 lbs. in 1903. There is no later production reported, and mine probably is idle.

The Kamioka mine is at Funatsu, Yoshiki-gori, Hida, Japan. Bichro Matsuda, superintendent. The property is essentially a silver-lead mine, making copper as a by-product. Ores are mainly argentiferous chalcopyrite, arsenopyrite, galena, sphalerite and pyrite, associated with occasional malachite and chrysocolla. The mine has steam and electric power, and a small smelter employing circa 600 men. Production has been as follows: 8,475 lbs. fine copper, 537,487 kin lead and 148,670 momme silver in 1900; 46,621 lbs. fine copper and 3,704,437 grams silver in 1903, and 84,331 lbs. fine copper and 1,336,239 momme silver in 1907.

The Sado mines are at Arakawa-cho, Sado, Japan. Y. Uriu, general superintendent. This property, 425 miles from Tokio, on the Island of Sado, formerly was owned by the Mikado and operated as a sort of government mining school, until 1898, when bought by the Mitsu Bishi company. The mines carry auriferous and argentiferous copper ores, being primarily gold and silver mines with a little copper secured as a by-product. Equipment includes steam, water and electric power, with an exceptionally good plant of modern mining machinery. Production has been as follows: 12,730 lbs. fine copper, 3,098,26 grams silver and 374,899 grams gold in 1906; 12,812 lbs. fine copper, 963,75 momme silver and 109,344 momme gold in 1907.

Production by all mines of the company was 12,727,944 lbs. fine copper in 1905, and 13,535,458 lbs. copper, 19,084 kgs. silver and 578 kgs. gold in 1907. The Mitsu Bishi is one of the four large copper mining companies operating in Japan, and, like the others, is exceptionally progressive. Success has not been won by the possession of mines of exceptional value, though the company has some excellent properties, but rather by the utilization of the most modern methods and appliances in mining and metallurgy, directed by the best technical skill available.

MITSUI & CO. JAPAN

Mine office: Funatsu, Yoshiki-gori, Hida, Japan. C. Tanikawa, superintendent. Property is the Mozumi mine, near the Kamioka of the Mitsu Bishi Goshi-Kwaisha. The Mozumi mine, opened A. D. 1573, is primarily a silver-lead mine, but a little copper is secured as a by-product. Production, 1906, was 119,044 lbs. fine copper and 858,900 grams fine silver.

In addition to metalliferous mines, Mitsui & Co. are extensive miners of al, and their various properties are well equipped and handled with technical kill.

MITTERBERG COPPER CO., LTD. **AUSTRIA.**

Office: 16 St. Helens Place, London, E. C., Eng. Mine office: Innsbruck, Tyrol, Austria. Chas. C. Turnbull, J. P., chairman; Gerald B. Elkington, J. P., vice-chairman; H. Read Smith, secretary; preceding officers, Jacques Oppenheim and G. Muir Ritchie, directors; Robt. Addie, consulting engineer; Henry Merton & Co., commercial agents. Organized Dec. 14, 1905, under laws of Great Britain, with capitalization £200,000, shares £1 par; issued, £175,000. Paid a 1s. dividend early 1907.

Lands, 10 mining claims and 10 prospecting claims, area 1,551 acres, also 3,304 acres of timber lands, 15 miles from Bishofshofen, midway between Salzburg and Innsbruck, in the Austrian Tyrol. The Mitterberger mine shows argillaceous Silurian schists, limestone and dolomite, carrying 3 parallel veins, known as the Josephi, Johanni and Marien, of 6′ to 9′ average width, carrying auriferous, argentiferous and nickeliferous chalcopyrite, associated with arsenopyrite, pyrrhotite and siderite, with gangue chiefly of quartz. The veins do not carry synchronous values, there being only one payable lode in any given cross-section, mineral values switching from one vein to another at intervals. The veins carry high values in stringers of 1″ to 30″ width, with balance of ore body payable throughout the vein, at the points mineralized, ore averaging circa 3% in copper tenor.

The Mitterberger mine is an old property, and has extensive underground workings, estimated to show 3,000,000 tons of ore, with circa 400,000 long tons blocked out for stoping, but these estimates are considered high. The mine is developed exclusively by tunnels, with small concentrators at the portals.

The reduction works, at Ausserfelden, include a mill, in which it was said, 1907, that an Elmore vacuum flotation process was being installed, and an antiquated smelter, which the company is said to plan reconstructing upon a modern scale. It is said also that the new management plans sinking two shafts, to open the mine at depth.

Production, under former ownership, was about 600 long tons of fine copper yearly, and for the first 9 months of operation, ending early 1907, production under present management was 473 long tons of fine copper, and a small quantity of bluestone, showing that the new owners apparently are making no more copper, despite the very high capitalization, than was made formerly. The arrangements of the company with the directors are considered unfavorable to the corporation, and the management has been sharply criticised, by Austrian mining publications of good standing, which complain that a raft of relatives and place-seekers were turned loose on the property.

MITTERBERGER KUPFER GEWERKSCHAFT. **AUSTRIA.**

Mine office: Innsbruck, Tyrol, Austria. Is controlled, through stock ownership, by Mitterberg Copper Co., Ltd., and property is described under title of that company.

COMPAÑIA MINERA MIXTA MICHOACANA. **MEXICO.**

Mine office: Ario de Rosales, Ario, Michoacán, Mex. Tomás González, manager. Has gold, silver and copper ores, employing circa 60 men at last accounts.

MIZPAH CONSOLIDATED COPPER & GOLD MINING CO. **NEVADA.**

Mine office: Mizpah, Elko Co., Nev. T. J. Duddleson, president; H. P. Crist, secretary and treasurer; Henry Darlington, manager. Lands, in the southeastern portion of Elko county, 5 miles east of a railroad, have a 70′ two-compartment incline shaft, planned to be sunk 250′, said to show ore assaying 17% copper *and $7 per ton in combined gold* and silver values.

MIZPAH COPPER CO. NEVAD

Dead. Organized circa February, 1907, and was succeeded, 1907, by E National Copper Co. Formerly at Ely, White Pine Co., Nev.

MIZPAH COPPER & GOLD MINING CO. NEVAD

Mine office: Mizpah, Elko Co., Nev. Has secured assays of 12 to 20 copper, with combined gold and silver values of $8 to $20 per ton.

MIZPAH COPPER KING MINING CO. NEVAD

Mine office: Mizpah, Elko Co., Nev. J. H. Wilson, president; Hon. Jo Donaldson, vice-president; C. C. Shettles, secretary and treasurer; Chas Young, superintendent; preceding officers, W. E. Young, Chas. S. Watson an A. E. Strong, directors. Organized 1907, under laws of Arizona, with capitali ization $1,000,000. Lands, 5 miles from Nevada Northern railway, sho quartzite and granite-porphyry dykes, carrying a 3′ fissure with ore assaying up to 32% copper, 23 oz. silver and $10 gold per ton, opened by a 60′ shaf and 100′ tunnel.

MIZPAH COPPER MINING CO. IDAHO

Office and mine: Palouse, Whitman Co., Wash. C. E. Frederick, presi dent; J. C. Northrup, vice-president; H. C. Johnson, secretary; W. F. Chalene treasurer. Organized October, 1906, under laws of Washington, with capitali ization $1,500,000. Lands, in the Hoodoo district of Latah county, Idaho, hav about 1,000′ of workings, main tunnel showing high-grade cuprite, azurite an malachite, all argentiferous and of good copper tenor. Expended, 1907, abou $20,000, and plans a 2,000′ aerial tramway to connect with a branch railway

MIZPAH MINES & REALTY CO. NEVADA

Dead. Was organized circa March, 1907. Formerly at Ely, White Pin Co., Nev.

MIZUSAWA MINE. JAPA

Owned by Furukawa Mining Co.

MOAB COPPER MINING CO. N. UTA

Office and mine: Moab, Grand Co., Utah. Organized Nov. 2, 1905, und laws of Utah, to take over claims in the La Sal district. Apparently id since birth.

MOBILE MINE. GEORGI

Mine office: Pierceville, Fannin Co., Ga. Is an old and slightly develop property, idle many years.

MINA MOCTEZUMA. MEXIC

Mine office: San Juan de Guadelupe, Durango, Mex. Ramón Gait owner and manager. Mine, opened by tunnel, carries argentiferous lead a copper ores, employing circa 50 men.

MOCTEZUMA-ARIZPE DEVELOPMENT CO., S. A. MEXIC

Is the Mexican incorporation of the Arizpe Development Co.

MOCTEZUMA COPPER CO. MEXIC

Office: 20-99 John St., New York, N. Y. Mine office: Nacozari, Moc zuma, Sonora, Mex. Jas. Douglas, president; A. C. James, vice-president; G Notman, secretary and treasurer; Jas. S. Douglas, superintendent; T. A. St ton, assistant superintendent; Geo. Kingdon and Geo. Reed, mine superinte ents; Al. Berner, mill superintendent; Dr. A. Sandberg, metallurgist; D. Giddings, engineer; Geo. M. Douglas, superintendent of motive power.

Organized under laws of West Virginia, with capitalization $3,000,0 Is a close corporation, owned and managed by members of the firm of Phel Dodge & Co.

Lands, circa 2,000 acres, in the Moctezuma and Arizpe districts of Sono including the Pilares de Nacozari mine, 6 miles east of Nacozari, also t *Juárez* and Nicolás ranches, area circa 35,000 acres.

The Pilares mine lies in a hilly country, near the divide of the Yaq

rivers. The lands have been probed extensively, by diamond drill . Ore occurs in a broad friction zone, in which the original rock has oken into pieces, ranging in size from gravel up to masses many tons ht, the porphyritic rock in this crushed zone, which is the matrix of , carrying mainly auriferous chalcopyrite, with occasional bornite, ed with pyrite. The deposit has no clearly defined footwall, and the dips at an angle of about 80°. There is a small outcrop of rich car- ore, but croppings are mainly red-stained porphyry, carrying consider- grade hematite. The leached zone is about 20′ in depth only, with coming in at depth of circa 60′. The ore body apparently is about e by 1,500′ long, at surface, with increased area at depth. The matrix e-grained silicious rhyolite, and ore averages about 2.7% in copper mined, before concentration, though some high grade ore is found. elopment is mainly by tunnel, though there are two vertical shafts, 87′ incline shaft on the San Pedro, deepest workings being only 700′. on is mainly through the Porvenir tunnel, about one mile long, with al shaft at the end, the tunnel, which is on the 700′ level, being with railroad tracks of 20″ gauge. The Porvenir tunnel has extensive at either side, with storage bins in a 25x100′ chamber, to which ore l down from the upper workings. The mine shows some enormous No. 4 stope, on the third level, being 85′ high, 125′ wide and 150′ long. e has about 50 miles of workings, and is very dry and well ventilated. is extracted in stopes 100′ square, and, after removal of ore, the de- topes are caved in from surface, after which another 100′ section is This is repeated for the entire length of the ore body, after which 100′ section is started, at a distance of 100′ from the previously mined leaving a 100′ strip of unmined ore between the length of the prop- er which the unmined section, 100′ wide, is stoped, ground being held roken rock on either side. The Pilares has one of the largest copper s in the world, and it is comparable, in many respects, with the Rio The mine has several million tons of ore blocked out for stoping, with of known ore of enormous tonnage.

new 1,200-h. p. power plant, completed 1908, has a battery of Stirling vith a 196′ reinforced concrete smokestack, and is equipped with steam and electric generators, distributing electric power to the new con- r and the mine. The old power plant has both steam and gas power, the latter, with Loomis-Pettibone generators making both producer er gases, which are stored in separate gasometers, of 15,000 and 5,000 et capacity respectively, gases being mixed in due proportions, before e consumption of fuel in the producer gas plant is under 3 lbs. of very wood, per horsepower hour. The old power plant has eight 100-h. p. single-cylinder 4-cycle gas engines, with 18½″ cylinders and 24″ naking 200 revolutions per minute, each direct-connected to a 65-kw. irrent generator, and one 200-h. p. Crossley engine, driving a 150-kw. r. Current is sent from the central station, at 250 volts, to some 40 motors, installations ranging from 5 to 175 h. p. each. Electric r the mine is transmitted 6 miles, at 6,600 volts, and at the mine is down to 230 volts, for the pumps, while the hoists and the electric ves use a 250-volt direct current.

dings, mainly of steel, include a brick machine-shop. Lighting at the l mills is by arc and incandescent electric lights.

mine, mill and smelter are connected by a 6-mile narrow-gauge rail- own as the High Line, which was extended, improved and relaid with el rails, in 1908. Rolling stock includes 60-ton locomotives and 25-ton -cars.

shares $1 par. Lands, 8 patented lode claims and 2 patented placer
a circa 150 acres, also a millsite and right of way to railroad, in-
operties formerly held by the Minah Consolidated. Presumably idle.

OLD MINING CO. **ARIZONA.**

Was a bad egg. Formerly at McCabe, Yavapai Co., Ariz.

COPPER MINING CO. **ARIZONA.**

: Utica, N. Y Mine office: Bisbee, Cochise Co., Ariz. W. J.
aite, president, R. Harlan, general manager; J. C. Green, secretary.
claims, unpatented, area circa 500 acres, at the northwestern end of
e Cañon, in the Warren district, showing 5 fissure veins, carrying
and sulphide ores, of which one vein, slightly developed, is said to
age assays of 7% copper, 10% lead, 14 oz. silver and 1 oz. gold per
shafts of 25', 40', 50' and 100', and has started a tunnel, to strike a
ned to show a gossan outcrop. Claims considered poorly located.

MINING CO. **NEW MEXICO.**

. Lands passed to American Metals Co. Formerly at Organ, Donna
N. M. Described Vol. VI.

ON GOLD & COPPER CO. **NEW MEXICO**

: 516-290 Broadway, New York, N. Y. Mine office: Cooney, Socorro
M. Thos. J. Curran, president and general manager; Walter D
, vice-president; Geo. H. Masten, secretary and treasurer; preceding
Geo. W. Stubbs and William J. Weatherby, directors; James P.
superintendent; J. D. Murphy, mine superintendent; Robert G.
mill superintendent. Organized Sept. 12, 1901, under laws of New
with capitalization $1,250,000, shares $1 par; issued, $950,000. Bonds,
authorized, $105,000 issued. Paid dividends of $22,500 to March

s, 29 claims, area 500 acres, partly patented, also a 40-acre millsite,
oney district of the Mogollon Mountains, circa 85 miles northeast of
y, the nearest railroad point, including 5 groups, known as the Cooney,
Little Charley, Independence and Fluoride.
Peacock mine has a 400' shaft, about 1,500' distant from the Cooney
l connected therewith by drifts on several levels. The Cooney group,
is developed by a 550' two-compartment main shaft. The mine is
n a fissure vein, in porphyry and andesite, that averages 5' to 10'
th occasional greater width, carrying a paystreak of 3' to 30' width,
erous narrow feeders, some of which have high values in gold. Ores
ipally slightly auriferous and highly argentiferous chalcocite, bornite
opyrite, with silver values increasing at depth. The Cooney has 6
ned, and the Cooney and Peacock have been producers of ores to the
value of $1,250,000, in the past.
ment includes a machine shop, electric light plant and a small con-
A receivership was asked, May, 1907, on the alleged ground of
and bad management, but apparently was not granted by the courts,
roperty was working, with a small force, at last accounts.

ON MINING CO. **NEW MEXICO.**

: Deming, N. M. Mine office: Cooney, Socorro Co., N. M. W. L.
esident and general manager; T. B. Dillon, vice-president and mill
ident; W. B. Westgate, secretary; E. S. Milford, treasurer. Company
ar lease of the Deep Down mill.

K MINING CO. **MICHIGAN.**

: 615 William St., New York, N. Y. Mine office: Mohawk, Kewee-
Mich. Mill office: Gay, Keweenaw Co., Mich. Employs circa 1,000
. E. Gay, president and treasurer; J. Wheeler Hardley, secretary;
Stanton, *vice-president; Fred Smith*, agent; preceding officers and

There are two mills, the old concentrator, of 600 tons daily capacity, being in 2 sections, equipped with 2 Blake crushers, 4 sets of 54x3" roughing rolls, 2 sets of finishing rolls, 24 revolving screens, ten 5' Huntington mills, 48 Harts jigs, 56 six-foot Frue vanners, 20 Bartlett tables, 7 settling tanks and hydraulic classifiers. Slimes from the settlers are worked by vanners exclusively, and rolls are used in crushing, as far as possible, to obviate sliming. Tailings are reground and treated on Frue vanners. Equipment of the old mill includes five 50-h. p. motors, eight 30-h. p. motors and one 20-h. p. motor. The old mill, designed by Dr. L. D. Ricketts, is said to save upwards of 90% of assay values, although the ore is not readily amenable to satisfactory treatment.

The new mill, of 2,000 tons nominal daily capacity, 6 miles from the mine, is in 2 sections, the first half having gone into commission circa July 1, 1908. Equipment includes 15 Allis-Chalmers 3-phase, 60-cycle, 220-volt induction motors, of 10 to 75 h. p. each, and the mill has 70 Risdon-Johnston concentrating tables. The new mill makes concentrates of about 12% copper tenor, with a saving of about 82% of assay values. Equipment includes 20 thirty-ton Ingoldsby side-dumping cars.

The mills are supplied with water by one Triplex and 3 Worthington pumps, forked from a well in the river to a reservoir at the millsite, and wash-water from the concentrators is settled and re-used.

The smelter, near the mill and 5 miles from the mine, has two 42x130" elliptical water-jacket blast-furnaces, of the Copper Queen type, flanked by tilting wells that can be tilted both front and rear. The converter department has 2 stands, with 96x114" shells of the Copper Queen type. Fumes from furnaces and converters pass into an 8' horizontal steel flue, connecting with a 750' brick flue that discharges into a 70' brick stack. Blast is furnished by a blower, direct-connected to a 75-h. p. dynamo. This smelter was closed, September, 1904, upon completion of the railroad line from Cos to Nacozari, since which time all concentrates have been shipped to the Douglas smelter of the Copper Queen, 77 miles distant.

The company maintains both English and Spanish schools, for children of employes, also a hospital, public library and well-stocked general store.

The mine workers are mainly Mexicans, as are many of the employes at the mill, and the bulk of the forces employed on surface. Native labor is paid 2 to 3 pesos per 10-hour shift. Forces are about 800 men.

Production has been as follows: 9,632,000 lbs. fine copper in 1904; 10,160,016 lbs. fine copper in 1905; 12,714,726 lbs. in 1906; 9,640,390 lbs. in 1907. Production for latter half of 1908 was considerably increased, as a result of starting the first section of the new mill, and should be raised, ultimately, to 25,000,000 to 30,000,000 lbs. fine copper yearly. The management is excellent, and the property, while low in average grade, has an enormous tonnage of ore, and is certain to become a much heavier producer in the future than it has been in the past.

MOCTEZUMA DEVELOPMENT CO. MEXICO.

Office: Douglas, Ariz. Mine office: Moctezuma, Sonora, Mex. Jas. E. Suits, T. S. Lamberson, Geo. W. Cass, J. J. Brown and Gid Graham, directors. Organized Aug. 6, 1906, under laws of Arizona, with capitalization $200,000, shares $1 par. Mine, having 4 tunnels, with about 2 miles of workings, greatest depth being 700', is claimed to have produced, under former ownership, about $2,000,000 worth of copper, lead, gold and silver ores.

MOCTIGAN MINING CO. MONTANA.

Office: care of J. H. Vivian, president, Butte, Silver Bow Co., Mont. Mine office: Corbin, Jefferson Co., Mont. Jas. Higgins, vice-president; J. K. Rowe, secretary and treasurer; preceding officers and Jas. B. White, directors. *Organized* February, 1907, under laws of Montana, with capitalization

$1,000,000, shares $1 par. Lands, 8 patented lode claims and 2 patented placer claims, area circa 150 acres, also a millsite and right of way to railroad, including properties formerly held by the Minah Consolidated. Presumably idle.

MODEL GOLD MINING CO. **ARIZONA.**

Dead. Was a bad egg. Formerly at McCabe, Yavapai Co., Ariz.

MODERN COPPER MINING CO. **ARIZONA.**

Office: Utica, N. Y. Mine office: Bisbee, Cochise Co., Ariz. W. J. Thistlethwaite, president, R. Harlan, general manager; J. C. Green, secretary. Lands, 28 claims, unpatented, area circa 500 acres, at the northwestern end of Tombstone Cañon, in the Warren district, showing 5 fissure veins, carrying carbonate and sulphide ores, of which one vein, slightly developed, is said to give average assays of 7% copper, 10% lead, 14 oz. silver and 1 oz. gold per ton. Has shafts of 25', 40', 50' and 100', and has started a tunnel, to strike a vein claimed to show a gossan outcrop. Claims considered poorly located.

MODOC MINING CO. **NEW MEXICO.**

Dead. Lands passed to American Metals Co. Formerly at Organ, Donna Ana Co., N. M. Described Vol. VI.

MOGOLLON GOLD & COPPER CO. **NEW MEXICO**

Office: 516-290 Broadway, New York, N. Y. Mine office: Cooney, Socorro Co., N. M. Thos. J. Curran, president and general manager; Walter D. Buchanan, vice-president; Geo. H. Masten, secretary and treasurer; preceding officers, Geo. W. Stubbs and William J. Weatherby, directors; James P. Butchen, superintendent; J. D. Murphy, mine superintendent; Robert G. Bailey, mill superintendent. Organized Sept. 12, 1901, under laws of New Mexico, with capitalization $1,250,000, shares $1 par; issued, $950,000. Bonds, $350,000 authorized, $105,000 issued. Paid dividends of $22,500 to March 12, 1906.

Lands, 29 claims, area 500 acres, partly patented, also a 40-acre millsite, in the Cooney district of the Mogollon Mountains, circa 85 miles northeast of Silver City, the nearest railroad point, including 5 groups, known as the Cooney, Peacock, Little Charley, Independence and Fluoride.

The Peacock mine has a 400' shaft, about 1,500' distant from the Cooney shaft, and connected therewith by drifts on several levels. The Cooney group, 8 claims, is developed by a 550' two-compartment main shaft. The mine is opened on a fissure vein, in porphyry and andesite, that averages 5' to 10' width, with occasional greater width, carrying a paystreak of 3' to 30' width, with numerous narrow feeders, some of which have high values in gold. Ores are principally slightly auriferous and highly argentiferous chalcocite, bornite and chalcopyrite, with silver values increasing at depth. The Cooney has 6 levels opened, and the Cooney and Peacock have been producers of ores to the estimated value of $1,250,000, in the past.

Equipment includes a machine shop, electric light plant and a small concentrator. A receivership was asked, May, 1907, on the alleged ground of insolvency and bad management, but apparently was not granted by the courts, and the property was working, with a small force, at last accounts.

MOGOLLON MINING CO. **NEW MEXICO.**

Office: Deming, N. M. Mine office: Cooney, Socorro Co., N. M. W. L. Nixon, president and general manager; T. B. Dillon, vice-president and mill superintendent; W. B. Westgate, secretary; E. S. Milford, treasurer. Company has a 5-year lease of the Deep Down mill.

MOHAWK MINING CO. **MICHIGAN.**

Office: 615 William St., New York, N. Y. Mine office: Mohawk, Keweenaw Co., Mich. Mill office: Gay, Keweenaw Co., Mich. Employs circa 1,000 men. Jos. E. Gay, president and treasurer; J. Wheeler Hardley, secretary; John R. Stanton, *vice-president; Fred Smith*, agent; preceding officers and

Wm. A. Paine, directors; Willard J. Smith, superintendent; Frank Getchell, clerk; John Trevorrow, mining captain; F. Wm. Hartmann, engineer.

Organized November, 1898, under laws of Michigan, with capitalization $2,500,000, shares $25 par; paid in, $21. Dividends have been as follows: $500,000 in 1906; $900,000 in 1907; $200,000 in 1908. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agent. Annual meeting, last Tuesday in March.

Lands, 800 acres, forming an irregular tract having its axis on the strike of the lode, in Sections 27, 28, 33 and 34, T. 57 N., R. 32 W. The Mohawk lies about 4 miles northeast of Calumet, having the Ahmeek and Seneca on the north, and Ahmeek on the west. The Mohawk, formerly known as the Fulton, was supposed to lie too far east to carry the outcrop of the Kearsarge bed until it was found, accidentally, circa 1896, by the cutting of a wood-road. The Kearsarge amygdaloidal bed, on which the mine is opened, outcrops for about one mile on the Mohawk tract, and the deepest shaft can be sunk, on the dip of the bed, for nearly 1½ miles, before reaching the boundary.

Crossing the Kearsarge lode at approximately right angles, with nearly vertical dip, are 3 fissure veins, carrying sundry arsenides of copper, including mohawkite, keweenawite, mohawk-whitneyite and stibio-domeykite, the two former being peculiar to this mine. Mohawkite occurs in considerable quantities in the upper north drifts of No. 1 shaft, in a vein ranging 3" to 3' in width, which was found mineralized at the crossing of the amygdaloidal bed and for an indefinite but unusually short distance on either side, the mohawkite and allied arsenides of copper occasionally occurring massive, though usually disseminated in an arenaceous gangue. On the deeper levels the mineral contents of the principal fissure veins are small, and apparently the production of mohawkite for the future will be trifling. Sales of mohawkite and allied arsenides, to end of 1907, returned $116,407.79.

In addition to the Kearsarge amygdaloid and the arsenical fissure veins, the Mohawk property carries sundry other copper-bearing amygdaloidal beds which may be given attention later, but work, very wisely, has been confined to date, to the development of a profitable mine on the Kearsarge bed.

The mine has 5 shafts, numbered from north to south. New openings have been as follows: 10,812' in 1905; 13,314' in 1906; 11,043' in 1907. The mine is equipped with Richmond electric signals, and operates 65 power drills. The shafts are connected by drifts down to and including the 5th level, these drifts running from the northern boundary to circa 600' south of No. 5 shaft. Shafts 1 to 4, inclusive, are connected down to and including the 8th level, and shafts 1 and 2 are connected to the 14th level. The use of concrete stringers was begun in 1905, in shafts 1, 2, 3 and 4, below the timbering formerly installed, and No. 5 has concrete stringers from surface. The wooden sleepers in the four older and deeper shafts will be replaced by concrete, from time to time, as the wooden sleepers decay.

Shafts are of uniform size, 8x18' inside of timbers, with solid cribbing through the overburden, and are to have identical equipments. The lode runs 15' to 18' wide, or about the same as in the Wolverine, and carries about the same percentage of copper as the Wolverine at similar depth, but is not nearly so rich as the bottom workings of the Wolverine.

No. 1 shaft, circa 1,500' south of the northern boundary, on the strike of the lode, is 1,700' deep. This shaft gave a good showing near surface, which became poor at depth, but is improving again in the lower levels. The hoist for No. 1, located in the central power plant of No. 2 shaft, operates two 4-ton skips in counterbalance. No. 1 has a combination shaft-rockhouse, equipped with a 12x24" Nordberg engine and rock-crushers.

No. 2 shaft, 1,100' southwest of No. 1, is 1,575' deep. Like No. 1, the

owing was good near surface, but poor at depth, though improving below e 12th level. The power plant at No. 2 shaft, serving both of the northern afts, includes an engine-house and boiler-house of mine rock with redstone mmings. Hoists are Nordberg double-conical-drum duplex-cylinder engines, od for 6,000′ depth, each handling two 4-ton skips in counterbalance. The iler-house has 2 locomotive firebox boilers, with foundations for 3 additional, nd the engine-house has an auxiliary compressor plant, with 2 Ingersoll-Ser-eant air-compressors, of 40 drills combined capacity. No. 2 has a combina-ion shaft-rockhouse, similar to No. 1 in design and equipment.

No. 3 shaft, 1,100′ southwest of No. 2, is 1,225′ deep, and will reach the estern boundary at a depth of circa 2,000′. Equipment includes a shaft-ockhouse similar to the northern shafts, and a Fraser & Chalmers geared oist, good for 3,000′ depth, operating 2-ton skips in balance.

No. 4 shaft, 1,300′ southwest of No. 3, is 1,175′ deep, developing good verage ground from surface. Equipment includes a steel shaft-rockhouse ith 3 crushers and a steam-hammer. The engine-house, of redstone, has a Nordberg double-conical-drum hoist, good for 6,000′ depth. The central com-pressor plant, at No. 4, has a 60-drill Nordberg air-compressor and a 60-drill Ingersoll-Sergeant cross-compound 2-stage air-compressor, with steam cylinders of 22″ and 46″ diameter, and air cylinders of 27¼″ and 42¼″ diameter, with stroke of 48″, having a piston efficiency of 5,260 cubic feet of free air per minute, compressed to a pressure of 70 lbs. per square inch. The boiler-house at No. 4, of redstone, has 5 locomotive firebox boilers and a 160′ self-sup-porting brick-lined steel smokestack.

No. 5 shaft, 1,800′ south of No. 4, is 575′ deep, with an excellent showing of copper from surface. The temporary rockhouse, with one crusher, is to be replaced by a shaft-rockhouse similar to those at the other shafts. Equipment includes a frame power-house, with a Fraser & Chalmers straight-face drum hoist good for 2,000′, brought from No. 1. A Bullock hoist, good for 4,000′ depth, formerly at No. 4 shaft of the Wolverine, is on the ground, and to be installed, during 1909.

There are large coal-trestles at No. 4 shaft and between shafts 2 and 3. The mine has a complete telephone system, on surface and underground. Buildings include two miners' changing houses, a machine shop, smithy, com-bination carpenter shop and warehouse, 30x40′ office, a well equipped hos-pital, numerous minor buildings and dwellings for employes. A considerable village, with business houses, a bank, newspaper, etc., has grown up around the mine.

The mill, near the mouth of the Tobacco river, on Traverse Bay, Lake Superior, opposite the mill of the Wolverine, is 178x206′ in size, of steel frame, sheathed with iron, on foundations of sandstone quarried from the ompany's own land. A steel trestle, 350′ long and 50′ high, leads into the ill, loaded cars being pulled up the incline by a winding engine. The mill as 4 stamps, all compounded, giving a daily capacity of about 3,000 tons. he mill has a Chilean mill and 3 sets of auxiliary crushing rolls, with fixed arings, to reduce oversize material from the mortar-boxes of the heads, is averaging 20 to 25% of rock stamped. Mineral from the wash dis-harges automatically, and is sluiced into the basement, where shoveled into ½-ton mineral cars, having 14-mesh perforated steel bottoms that allow the raining out of water, after which the cars are weighed, then lifted by a age-elevator and dumped into bins. The bin-house has 4 compartments, each ith a cement floor and steam pipes underneath for drying the remaining oisture from the wash. The mineral is taken from the bin-house, in self-amping steel mineral cars, to the Michigan smelter at Houghton, for re-uction.

The boiler-house, of steel, adjoining the mill, has four 250-h. p. Stirling water-tube boilers.

Water for both the Mohawk and Wolverine mills is furnished from a joint pumphouse, standing near the Tobacco River, from which water is taken. The pumphouse has a 20,000,000-gallon triple expansion Snow pump, supplemented by a new 9,000,000-gallon Nordberg pump, giving an ample water supply for both mills.

A 30x300' wharf, on Traverse Bay, a short distance from the mill, with 14' of clear water alongside, is fitted with coal-hoists and storage sheds, ample for the needs of both mills.

The townsite at the Mohawk and Wolverine mills, named in deserved honor of Jos. E. Gay, long identified with honest and successful copper mining in the Lake Superior district, is well laid out, with wide streets, water mains and hydrants, and has a number of substantial dwellings for employés.

Production has been as follows: 6,284,327 lbs. fine copper in 1903; 8,149,515 lbs. in 1904; 9,387,614 lbs. in 1905; 9,352,252 lbs. in 1906; 10,107,205 lbs. in 1907. In October, 1908, the fourth stamp was being worked part time and production for 1909 should be circa 13,000,000 lbs. fine copper. Yield of fine copper per ton of rock stamped was 21.79 lbs. in 1903; 17.76 lbs. in 1904; 16.01 lbs. in 1905; 15.12 lbs. in 1906, and 15.77 lbs. in 1907. Costs per ton of rock stamped, less construction, were $1.92 in 1903; $1.63 in 1904; $1.56 in 1905, $1.59 in 1906 and $1.54 in 1907. The cost of copper per pound, exclusive of construction, was 8.78 cents in 1903; 9.19 cents in 1904; 9.77 cents in 1905; 10. cents in 1906, and 10.725 cents in 1907, with total costs, for 1907, including construction, of 11.75 cents per pound. Costs for 1908 should be circa 10 cents per pound. The Mohawk, while it has not proven as rich a mine as was generally anticipated, is a magnificent property, with an assured future, and has a strong, honest and thoroughly competent management.

MOHAWK MINING CO. UTAH.

Mine office: Bingham Canyon, Salt Lake Co., Utah. F. S. Bascom, president; E. B. Critchlow, vice-president; Edward W. Duncan, secretary and treasurer. Organized Nov. 28, 1902, under laws of Utah, with capitalization $150,000. Lands, 7 claims. Idle and apparently moribund.

MOIRA COPPER CO. ALASKA.

Office: Milwaukee, Wis. Letter returned unclaimed from former mine office, Ketchikan, Alaska. Lands, 7 claims, adjoining the Niblack Copper Co., on Prince of Wales Island. Idle.

MOJAVE COPPER CO. CALIFORNIA.

Dead. Operated circa 1902. Formerly at Mojave, Kern Co., Cal.

MOLLIE STARK COPPER MINING CO. WYOMING.

Dead. Formerly at Encampment, Carbon Co., Wyo. Described Vol. VI.

MOLOLOA MINING CO. MEXICO.

Office: Toronto, Ont. Mine office: Hostotipaquillo, Ahualulco, Jalisco, Mex. Dr. Willet G. Miller, president; Frank G. Stevens, managing director. Organized 1908, under laws of Ontario, with capitalization $250,000. Property, bought of Carlos Romero, is said to show good ore.

MONA & PARYS MINES, LTD. WALES.

Office: Amlwch, Anglesey, Wales. Mine office: Mona, Amlwch, Anglesey, Wales. R. Bridson, secretary. Organized Jan. 13, 1899, with capitalization £75,000, shares £1 par; issued, £55,000. Debentures, £20,000 first mortgage, at 6%, and £10,000 second mortgage, at 7%. Lands, 1,067 acres, with improved water-frontage, warehouses, ochre works, tramways, etc. Also has a color-works plant at Amlwch. Makes a little copper, by cementation, from mine-*waters*. Mines in this district were worked by the Romans. The Parys mine

as opened 1768, and made 3,000 tons of copper in 1784. Present production 25 to 50 tons fine copper yearly.

ONARCH CONSOLIDATED GOLD & COPPER MINING & SMELTING CO. **COLORADO.**

Office: 1932 Thirteenth St., Boulder, Colo. Mine office: Sunshine, oulder Co., Colo. Thos. S. Waltenmeyer, president and treasurer; Chas. Wol ott, vice-president; F. H. Wolcott, secretary. Organized September, 1903, nder laws of Colorado, with capitalization $1,000,000, shares $1 par. Bonds, 200,000, at 6%, running 3 years; $200,000 outstanding.

Lands include the Buena and Pilot mines, at Sunshine, Colorado, which are old properties, and the Copper King group, on the south fork of the Grand iver, in Middle Park, Grant county, Colorado, latter, area 1,740 acres, carrying 3 miles of the strike of a copper vein said to be 15′ to 50′ wide. The Copper King group has a 25-h. p. hydro-electric power installation, and developments thereon have been suspended for several years. The company claims to have 50,000 tons of ore blocked out in its gold mines, and the mill was remodeled, 1907. Early 1908 company planned production on a considerable scale, but at last accounts, circa September, 1908, a reorganization was under consideration.

MONARCH COPPER MINING CO. **CALIFORNIA.**

Dead. Was a swindle, promoted by "Baron" W. E. von Johannsen. Formerly at Callahan, Siskiyou Co., Cal. Fully described Vol. VII.

MONARCH GOLD & COPPER MINES, LTD. **BRITISH COLUMBIA.**

Dead. Formerly at Nelson, Trail district, B. C.

MONARCH GOLD & COPPER MINING CO. **ARIZONA.**

Dead. Was promoted by G. P. Morrill. Formerly at Big Bug, Yavapai Co., Ariz.

MONARCH MINES & SMELTERS CORPORATION. **UTAH.**

Dead. Name changed, Nov. 26, 1904, to Nevada-Utah Mines & Smelters Corporation. Formerly at Milford, Beaver Co., Utah.

MONARCH MINING, MILLING & SMELTING CO. **ARIZONA.**

Mine office: Macon, Ga. Mine office: Wickenburg, Maricopa Co., Ariz. Has about 7,000′ of workings, including various tunnels, shafts, pits and trenches. Equipment includes an air-compressor and experimental mill.

ONARCH MINING & SMELTING CO. **ARIZONA.**

Mine office: Wickenburg, Maricopa Co., Ariz. J. T. Ross, president; K. Harris, vice-president; J. F. Minton, secretary and treasurer. Organized gust, 1904, under laws of Arizona, with capitalization $1,000,000, shares $1 r. Lands, 10 claims, known as the Three Black Buttes, in the Black Rock strict, 9 miles southeast of Wickenburg, opened by tunnel, with circa 4,000′ workings. Ores are low in average tenor, giving assays of 3 to 20% copper d $3 to $15 gold per ton. Old 50-ton mill, burned April, 1907, was replaced, 08, by a 50-ton mill on same site.

ONARCH-SMUGGLER MINING & REDUCTION CO. **COLORADO.**

Office: 521 Commonwealth Bldg., Denver, Colo. Mine office: Eldora, oulder Co., Colo. Earl W. Kelly, president and general manager; Fred S. reet, vice-president; J. Horace Shepard, treasurer; preceding officers, Eda . Kelly and Oscar Sorsonsen, directors; Charles E. Dawson, secretary. Organed Jan. 2, 1906, under laws of Colorado, with capitalization $3,000,000, shares par.

Lands, 14 claims, area 137 acres, in the Harmon district of Grant county, olorado, circa 50 miles northwest of Denver, said to show surface ores assayg $6 to $98 per ton. Company planned a 1,500′ tunnel, designed to cut the ain vein at 800′ depth. *Idle.*

AGUIRRE MONCADA i HERMANOS. CHILE.

Mine office: Higuera, La Serena, Coquimbo, Chile. Property is the Carmelita mine, at Yerbas Buenas, circa 13 leagues from Higuera, the nearest railroad point, with 10 pesos per ton transportation charges on ore and supplies. Mine, opened to depth of 115 meters, produced 200 metric tons of 12% ore, after discarding about 2,000 tons of 5% ore, from a vein of 6′ to 7′ width, in 1903.

MOND NICKEL CO., LTD. ONTARIO.

Office: 39 Victoria St., London, S. W., Eng. Mine office: Victoria Mines, Algoma, Ont. Works office: Clydach, Wales. Dr. Ludwig Mond, F. R. S., chairman; Robt. Mathias, secretary; Dr. Bernard Mohr, general manager; C. V. Corliss, mine superintendent. Organized Sept. 20, 1900, under laws of Great Britain, with capitalization £600,000, in £250,000 cumulative 7% shares of £5 par, £300,000 ordinary shares of £1 par, and £50,000 deferred shares of £1 par, all issued and fully paid. Paid dividends on ordinary shares of 6% in 1905, 10% in 1906, and 12½% in 1907. Paid dividends on deferred shares of 18% in 1906 and 33% in 1907.

Lands, 3,350 acres freehold and 1,550 acres leasehold, held under 3-year option, in the townships of Blezard, Denison, Snider and Garson, in the Sudbury district of Ontario, carrying nickeliferous and cupriferous pyrrhotite.

The Victoria mine, which is the principal property, has a 3-compartment vertical shaft, 4x12′ inside of timbers, sunk to depth of circa 720′, with 9 levels opened, the bottom level showing ore bodies maintaining their size and quality of ore. The Victoria carries 2 lenses of nickeliferous pyrrhotite and chalcopyrite about 160′ apart, with east and west strike, and uniform dip of about 75° to the east, connected by stringers, in schistose diorite near a granite contact. No. 1 shaft has a rockhouse and shafthouse. Equipment includes 5-drill and 10-drill Rand straight-line air-compressors, and hoists.

The Garson mine has a 225′ shaft, and apparently has been idle for some years.

The mine and works are operated by electric power, transmitted 10 miles from the Wahnapitae River, by the Wahnapitae Power Co.

A 11,000′ Bleichert aërial gravity tram connects the Victoria mine with the roast-heaps and smelters. Ore is dumped from the buckets of the aërial tram at the roast-yard, and, after burning, is carried by bucket to the smelter.

The smelter, of steel, sheathed with corrugated iron, has 2 water-jacket blast-furnaces, and 2 converter stands with a traveling crane. The smelter power plant has five 100-h. p. return tubular boilers, a Riedler air-compressor for converter blast, 2 Connersville blowers with direct connected engines, and a 125-kw. dynamo. The works have direct connection with the Canadian Pacific railway.

About 200 men are employed at the mine and smelter.

At the refining works, in the Swansea Valley, the bessemerized copper-nickel matte from the smelter is dead-roasted and treated with dilute sulphuric acid, which permits the extraction of about two-thirds of the copper and 2% of the contained nickel. The residue, after drying, assaying 45 to 60% nickel, is treated, in charges of 500 kgs., with water-gas, in a reduction tower, at a temperature of about 300° Centigrade. This tower has shelves, and the ore is moved from shelf to shelf by automatic rakes, the lower shelves being cooled. After treatment in the reduction tower, the charge is transferred to a volatizing tower, and treated with carbon monoxide, at a temperature of about 100° C. The residue therefrom is returned to the reducing tower, and the charge goes forward and back between the two towers, for 10 to 15 days, and when 60% of the nickel has been volatized, as nickel carbonyl, the residue of the charge is returned to the roasting furnace. The nickel carbonyl

treated in a decomposing apparatus, wherein the metal is recovered in granules, assaying 99.4% to 99.8% nickel. The copper is turned out as blue-stone.

Production for 1906 was 54,079 short tons of ore, yielding 3,365 short tons of nickel-copper matte that returned 2,588,000 lbs. fine copper and 1,798,000 lbs. refined nickel.

MONETT GOLD & COPPER MINING & MILLING CO. **UTAH.**

Office: care of J. J. Davis, secretary, Monett, Mo. Mine office: Ibapah, Tooele Co., Utah. O. P. Shaffer, president; H. L. Eckert, vice-president; F. E. Shaffer, treasurer. Organized under laws of Utah, with capitalization $100,000, shares 10 cents par. Lands, 37 claims, area 740 acres, showing argentiferous copper and lead ores.

MONEY METALS MINING CO. **ARIZONA.**

Office: Prescott, Arizona. Mine office: Jerome, Yavapai Co., Ariz. H. L. Sweeney, vice-president; W. H. Reiterman, secretary, treasurer and general manager. Organized 1905, with capitalization $1,200,000, shares $1 par. Lands, 7 claims, unpatented, also sundry timber lands, giving total holdings of 120 acres, in the Big Bug and Black Hills districts, circa 3 miles south of the Yaeger Cañon mine, and 6 miles from a railroad. Mine has 275′ of workings, including the Bordeaux shaft of 165′, showing a 3′ vein of argentiferous lead and copper sulphides.

MONFARLAND COPPER EXPLORATION, LTD. **TRANSVAAL.**

Office: 52 New Stock Exchange, Johannesburg, Transvaal. H. Martyn Burgess, manager. Organized April, 1908, under laws of Transvaal, with capitalization £2,350. Lands show 2 practically parallel veins, one of circa 6′ average width, carrying considerable chalcocite, and one of about 8′ width showing chalcopyrite and what the manager terms carbonate of copper glance. Some trenching was done, and a shaft was started, in the 6′ vein, July, 1908.

MONIDA GOLD & COPPER MINING CO. **IDAHO.**

Letter returned unclaimed from former office and mine, Mullan, Shoshone Co., Idaho. Organized under laws of Idaho, with capitalization $1,000,000, shares $1 par, by L. T. Nystrom, et al. Lands, 6 claims, in the Hunter district.

MONITOR CONSOLIDATED COPPER MINING CO. **IDAHO.**

Office: Wallace, Idaho. Mine office: Saltese, Missoula Co., Mont. Hon. Herman J. Rossi and Dr. Harold J. Reed, managers; Thos. Jay, superintendent. Paid a dividend, 1907, of $9,500.

Lands, 12 claims, near the Richmond, 6 miles west of Saltese, just over the line in Shoshone county, Idaho, carrying a fissure vein up to 14′ in width, with northeast and southwest strike, standing nearly vertical. Mine has a 90′ shaft and management plans a tunnel to carry a back of about 1,000′. Shipments, 1907, of selected ore, returned 17 to 22% copper, circa 7 oz. silver and $1.50 to $2 gold per ton, ore being mainly chalcopyrite, carrying an excess of iron with very little silica, and occasional native copper. Has steam power and a 3-drill air-compressor. Surveyed line for extension of Chicago, Milwaukee & St. Paul Railway passes within 3 miles of the mine. Production, 1906, was 320,000 lbs. fine copper.

MONITOR COPPER MINING & SMELTING CO.

Office: Wallace, Idaho.

MONITOR MINING CO. **BRITISH COLUMBIA.**

Dead. Formerly at Alberni, Vancouver Island, B. C. Described Vol. III.

MONITOR TUNNEL & PARK CANYON MINING CO. **MONTANA.**

Mine office: Butte, Silver Bow Co., Mont. Capitalization, $3,750,000, shares $1 par. Lands are *in Park Cañon, about* 2 miles east of Butte, near the

Homestake claim of the Butte Coalition, having a 1,500′ crosscut tunnel s
ing a wide ledge.

MONO-BALTIC MINING & SMELTING CO. COLORA

Office: 50 Congress St., Boston, Mass. Mine office: Red Moun
Ouray Co., Colo. E. W. Averill, president and treasurer; Frank Woodb
vice-president; E. J. Wescott, secretary; Joseph Irving, general mana
preceding officers, M. T. Chestnut and S. J. Ryan, directors. Organized
under laws of Colorado, with capitalization $500,000, shares $10 par; iss
$300,000.

Lands, circa 180 acres, in the Red Mountain district, showing fissure v
and contact deposits having large bodies of oxidized silicious ores of
tenor, but carrying high silver values, with some gold, also bornite and cha
pyrite associated with pyrite, all auriferous and argentiferous, a comp
sampling of the mine, with 500 assays, giving an average of 3.5% copper
12 oz. silver per ton, with small gold values.

Development is by 4 shafts, deepest 140′, and by tunnels of 120′, 7
1,000′, and 1,100′, with circa 8,000′ of workings, estimated by company
show 122,000 tons of ore.

Equipment includes a smithy and shops. The property carries limest
for fluxing, and a smelter site has been graded and the company contempl
building a steel smelter building, with bins, aerial tram, and a 42x120″ wa
jacket blast-furnace, planned to be blown in circa July, 1909.

MONROE CONSOLIDATED MINES CO. ARIZO

Dead. Formerly at Prescott, Yavapai Co., Ariz.

MONSTER MINING CO. UT

Dead. Was merged, circa 1907, in Garrison-Monster Mining Co.
merly at Ibapah, Tooele Co., Utah.

MONTAGNAT MINE. NEW CALEDON

Mine office: Diahot, New Caledonia. Property, slightly prospected, sh
ore for upwards of 500 meters length. Idle some years.

MONTANA APEX COPPER CO. MONTA

Office and mine: Dillon, Beaverhead Co., Mont. Organized circa Fe
ary, 1907, under laws of Arizona, with capitalization $800,000. Land
claims, known as the Snowball, Whale and Los Angeles, in the Utopia
trict, near the Indian Queen mine, showing indications of copper.

MONTANA & ARIZONA CONSOLIDATED COPPER CO. MONTA

Dead. Disincorporated circa 1902. Formerly had an office at 68 S
St., Boston, Mass.

MONTANA-ARIZONA COPPER CO. ARIZO

Office: Spokane, Wash. Mine office: Planet, Yuma Co., Ariz. J.
Greenough, manager. Lands, 26 claims, area 520 acres, circa 30 miles n
of Wendendale, the nearest railroad station. Property is said to show 5 v
of 3′ to 100′ width, traceable circa 7,000′, including a 3′ vein carrying
gold values. Development is by a 2-compartment 300′ shaft and a consi
able number of trenches. Equipment includes a 60-h. p. gasoline hoist. M
agement considered good.

MONTANA BELLE COPPER CO. ARIZO

Office: 52 Jacobson Bldg., Denver, Colo. Mine office: Wendendale, Y
Co., Ariz. Chas. P. Pierce, president; Luther Bain, vice-president; A
Emberson, secretary and treasurer; preceding officers and A. T. Cronin,
rectors. Organized Feb. 7, 1906, under laws of Arizona, with capitaliza
$800,000, shares $1 par.

Lands, 6 claims, area 120 acres, one mile west of Cunningham Pass
6 miles north of Wellton, in the Ellsworth district of the Harcúvar M
tains, said to show a vein of 8′ to 25′ width, with a good gossan carr

idized ores to a depth of 100′ to 150′, succeeded by sulphides. Shaft is said show ore assaying 5 to 17% copper, and the property is said also to have nsiderable free milling gold ore. Company's advertising is much disliked, cause misleading on many points.

ONTANA-BOSTON MINING & MILLING CO. **MONTANA.**

Office and mine: De Borgia, Missoula Co., Mont. Emil Anderson, superinndent. Organized July, 1907, under laws of Montana, with capitalization 100,000, shares 10 cents par.

ONTANA CONSOLIDATED COPPER CO. **MONTANA.**

Office: 46 Wall St., New York, N. Y. Mine office: Basin, Jefferson Co., Mont. Samuel L. Fuller, president; Marcus L. Hewett, vice-president; Otto Julius Merkel, secretary; preceding officers, G. Herman Kinnicut, Ellis Postlethwaite and D. Crawford Clark, directors; Capt. John L. Armit, general manager; M. E. Barr, engineer.

Organized June 13, 1906, under laws of Maine, as International Copper Co., with capitalization $10,000,000, and name changed to present title July 19, 1906.

Lands, 699 acres, in 4 groups, lying northeast of the New Boston, including several old properties, idle, except for operations of leasers, for 9 to 13 years before purchase by present company. The Hope group, 192 acres, includes the Hope and Comet mines, formerly considerable producers, popularly credited with a gross output of $10,000,000, which probably is a considerable overestimate. The Gray Eagle group, 139 acres, includes the Gray Eagle and Minneapolis mines. There also are placer claims and millsites aggregating 101 acres. The Comet mine, 820′ deep, and the Hope mine, 220′ deep, are the principal properties, these showing fissure veins in granite, carrying mainly argentiferous and auriferous copper and zinc sulphides, ore reserves in the old mines being mainly refractory zinc and lead sulphides, associated with auriferous pyrite, unprofitable for direct shipment and requiring concentration. Management expects an increase of copper and silver values with depth. Equipment includes an electric plant.

Company refuses to furnish a statement, declaring that there is nothing interest, and that property is in the hands of a few friends only. Development apparently is along business-like and well considered lines, and property considered promising.

ONTANA CONSOLIDATED COPPER CO. **MONTANA.**

Office: 42 Broadway, New York, N. Y. Mine office: Butte, Silver Bow , Mont. H. C. Wilmot, superintendent. Organized circa June, 1907, under s of Maine, with capitalization $2,500,000, shares $1 par. Is controlled by General Development Co.

Lands include the Granite Mountain claim, near the Jessie mine of the rth Butte, but do not include the Flatiron mine, near the Butte-Ballaklava. e Altoona mine, in the northern part of Butte, held, 1906, under bond and se, has been abandoned.

ONTANA CONSOLIDATED MINING CO. **MONTANA.**

Dead. A swindle, put out, circa 1903, by M. P. Hillyer & Co. Formerly Saltese, Missoula Co., Mont.

ONTANA COPPER CO. **MONTANA.**

Office: care of John F. Davies, Butte, Mont. Letter returned unclaimed m former mine office, Helena, Lewis & Clark Co., Mont. Lands, known as e Spokane Hill group, 7 miles northeast of East Helena, have a 115′ shaft, owing ore said to give average assays of 10% copper. Has steam power d several mine buildings.

ONTANA COPPER & GOLD MINING CO. **MONTANA.**

Office: 1122-135 *Adams St., Chicago, Ills.* Letter returned unclaimed

from former mine office, Dillon, Beaverhead Co., Mont. Was controlled through stock ownership, by International Copper & Gold Co., supposedly succeeded by Sonora Central Mines Co. Lands were 6 claims, in the Stone Creek district of Madison county, Montana, claimed to show carbonate ores. Is regarded with suspicion.

MONTANA COPPER MINING CO. MONTANA

Dead. Formerly at Helmville, Powell Co., Mont. Described Vol. II.

MONTANA COPPER & SILVER MINING CO. MONTANA

Office: Butte, Mont. Mine office: Clancey, Jefferson Co., Mont. C. H. Lane, superintendent. Capitalization $2,000,000, shares $10 par. Lands, 2 claims, in Lump Gulch, 2 miles from Clancey, opened by the 275′ Clara Bell shaft, lower drift of which shows tetradedrite assaying 60 to 400 oz. silver per ton. Has steam power.

MONTANA ELECTROLYTIC CO. MONTANA.

Works office: Wickes, Jefferson Co., Mont. J. L. Malm, superintendent.

MONTANA FURNACE CREEK COPPER CO. CALIFORNIA.

Office: care of Hon. John MacGinnis, Butte, Mont. Mine office: Green water, Inyo Co., Cal. Organized Dec. 6, 1906, under laws of Montana, with capitalization $1,000,000, shares $1 par. Lands, 8 claims. Idle at last accounts.

MONTANA-HECLA MINING CO. MONTANA.

Office: 1004 Broadway, Oakland, Cal. Mine office: Norris, Madison Co., Mont. J. K. Riordan, president, treasurer and general manager; M. F. Webster, vice-president; Mark E. Davis, secretary; Daniel O'Shea, superintendent. Organized Jan. 20, 1906, under laws of Washington, with capitalization $375,000, shares $2 par; issued, $225,000.

Lands, 28 claims, area 560 acres, on Old Colony Hill, a few miles from Norris, in the Lower Warm Springs unorganized district. Property shows 3 fissure veins, in granite, of which one, under development, of about 6′ average width, traceable 2 miles, shows, below circa 200′ depth, sulphide ores with silicious gangue, giving assays of 0.5 to 1% copper, 3% lead, 50 to 75 oz. silver and $2 gold per ton, with ledge matter giving assays up to $4.12 gold per ton. Development is by numerous pits of 10′ to 50′ depth, shafts of 95′, 100′ and 210′, and tunnels of 250′ and 700′, with a total of 2,340′ of workings.

Company plans installing a 200-h. p. water plant, having circa 1,000 h. p. available, also a new mining plant with a 3-drill air-compressor and 50-h. p. Westinghouse electric motor. There are 7 mine buildings, and a good wagon road to the Northern Pacific, 3 miles distant.

Property is not yet deep enough for copper in considerable quantities, but indications are decidedly favorable, and company plans steady development and extending No. 1 tunnel 1,500′ on the ledge. Property considered promising.

MONTANA-ILLINOIS COPPER MINING CO. MONTANA.

Office: 218 LaSalle St., Chicago, Ills. Mine office: Mammoth, Madison Co., Mont. W. G. Bennett, president. Organized circa 1907, under laws of Montana, with capitalization $2,000,000, shares $1 par. Lands, 11 lode claims, 2 placer claims, 1 millsite, 1 water right and 320 acres timber lands, giving total holdings of circa 550 acres, including part of lands formerly held by Bismarck-Nugget Gulch, in the Ruby Mountains. Mine, said to have circa 1,100′ of workings, shows bornite and chalcopyrite said to average about 5% copper, 1.25 oz. silver and 40 cents gold per ton. The Bismarck-Nugget Gulch had a 30-ton smelter, presumably held by present company. According to company's advertising, its shares offer a better investment than North Butte *which nobody but fools will believe.* Is not regarded favorably.

ANA MINE. **AUSTRALIA.**
ne office: Sunny Corner, N. S. W., Australia. M. Welch, superintend-
as a shaft about 150′ deep and has secured ore up to 16% in copper

ANA MINERAL LAND DEVELOPMENT CO. **MONTANA.**
ce: Findlay, Ohio. Mine office: Basin, Jefferson Co., Mont. John
r, president and treasurer; Antoine Lutz, vice-president; Alfred Graber,
y; Thos. C. Kelly, superintendent. Organized 1902, under laws of
a, with capitalization $3,500,000, shares $1 par.
ds, 19 claims, area circa 300 acres, known as the Eva May and Red
up, on Cataract Creek. Property shows fissure veins in granite carry-
hide ores, mainly chalcopyrite. Development is by a 1,200′ vertical
d tunnels of 525′, 1,400′ and 800′, developing a vein of 100′ claimed
iving assays of 6% copper, 6 to 12% lead, 15 to 30 oz. silver and 20
$3 gold per ton. The property shows a considerable body of low to
grade ore, and the company estimates 50,000 tons blocked out for

ipment includes a 200-h. p. steam hoist having two 75-h. p. hoists,
g a 14x16″ Vulcan hoist raising single-deck cages, and a 4-drill Inger-
cant air-compressor. Buildings include a 20x40′ log machine shop,
mithy, 24x34′ carpenter-shop, and a 30x80′ powerhouse. The concen-
f logs, is 35x120′, with a 7x10″ Blake crusher, one set of rolls, 8 three-
nent jigs and 2 Wilfley tables. The property, which has been de-
steadily, and has produced circa 7,000 tons of ore, sold for $166,238,
ered promising.

NA MINING & DEVELOPMENT CO. **MONTANA.**
l. Stock was "guaranteed" by "gold bonds." Formerly at Carter,
Co., Mont. Fully described Vol. V.

NA-MORNING MINING CO. **MONTANA.**
e office: Libby, Flathead Co., Mont. Lands, on Callihan Creek, show
of about 8′ width, carrying a 5′ paystreak of mixed galena and
e, apparently of smelting grade, with about 3′ of copper sulphides of
ating grade.

NA-NEVADA COPPER CO. **NEVADA.**
e office: Ely, White Pine Co., Nev. Capitalization $5,000,000, shares
Lands are said to be fairly located, but in limestone.

NA ORE PURCHASING CO. **MONTANA.**
e: 42 Broadway, New York, N. Y. Mine office: Butte, Silver Bow
t. F. August Heinze, president and general manager; John MacGin-
-president; Arthur P. Heinze, secretary; Stanley Gifford, treasurer.
d 1883, under laws of Montana, with capitalization $2,500,000; deben-
,000,000, first-mortgage 6% bonds. Is controlled by United Copper
h holds 76,791 shares out of 80,000 shares issued, and which formerly
he entire bond issue. The mining property of the company was sold,
Butte Coalition Mining Co.

NA REDUCTION CO. **MONTANA.**
e office: Cooke, Park Co., Mont. C. R. Tuttle, president; Robt. I.
secretary. Organized under laws of Arizona, with alleged capitaliza-
1,000,000, shares $1 par. Idle and apparently moribund.

NA SCOTCH BONNET COPPER **MONTANA.**
OLD MINING CO.
e: Spokane, Wash. Mine office: Cooke, Park Co., Mont. W. M.
n, general manager. Capitalization $3,000,000. Lands include the
aggie and Jennie V. groups, carrying ores of gold, silver and copper,
New World district, 70 miles from a railroad. A radical change in

management, made September, 1907, is hoped to prove a betterment, and scarcely can prove otherwise.

MONTANA STANDARD MINING CO. MONTANA.

Office: Columbus, Ohio. Mine office: Thompson, Sanders Co., Mont. M. J. Lisle, president; M. J. Maher, vice-president; Otto A. Schenk, secretary and treasurer; preceding officers, B. B. Baker, John Chester and H. Eddy, directors; Fremont S. Rowe, manager. Capitalization 1,000,000 shares, presumably $1 par. Lands, 10 miles east of the Bitter Root Mountains and 11 miles from Thompson, show 3 veins, 2 of which have been prospected, one being said to show 6′ to 8′ of concentrating ore.

MONTANA VERDE COPPER CO. MONTANA.

Dead. Formerly at Corbin, Jefferson Co., Mont.

MONTANA ZINC CO. MONTANA.

Mine office: Butte, Silver Bow Co., Mont. A. L. Strasberger, president. Practically succeeded by Butte Copper & Zinc Co., only assets, 1907, being 7,500 shares of Alice stock. Fully described Vol. VI.

HILARIO MONTAÑO. MEXICO.

Office and mine: Guachinango, Mascota, Jalisco, Mex. Lands, 8 pertenencias, showing strong veins, carrying auriferous and argentiferous copper ore, with antigua workings and recent workings.

SOCIÉTÉ DES MINES DE CUIVRE DE MONT CHALMERS. AUSTRALIA.

Dead. Voluntarily wound up, May 1, 1901. Formerly at Mt. Chalmers, Queensland, Australia.

MONTE CARLO CONSOLIDATED COPPER CO. NEW MEXICO.

Office: 1013 Union Bank Bldg., Pittsburg, Pa. Mine office: Orogrande, Otero Co., N. M. Chas. H. Spriggs, president; H. H. Schneider, secretary; G. B. Wharey, treasurer. Organized 1907, under laws of New Mexico, with capitalization $1,000,000, shares $25 par. Lands, 170 acres, 5 miles north of Orogrande, in the northern end of the Jarilla Mountains, having two 70′ shafts and a 100′ three-compartment shaft, showing ore that has assayed up to 35% copper, 800 oz. silver and $4 gold per ton. Was developing steadily at last accounts.

SOCIETÀ ANONIMA DELLE MINIÈRE DI MONTECATINI. ITALY.

Office: 49 Piazza Santa Apostoli, Rome, Italy. Mine offices: Boccheggiano, Grosseto, Tuscany, Italy, and Massa Marittima, Grosseto, Tuscany, Italy. I. Castelbolognesi, president; Alfred Deschars, vice-president; Alfredo Santori, secretary; Paolo Marengo, general manager; Paolo Cerrina, superintendent; Guglielmo Vallada, engineer. Organized 1888, under laws of Italy, with capitalization 5,000,000 lire, increased, circa 1906, to 6,500,000 lire, shares 100 lire par. Paid dividends, 1899-1902, of 82 lire per share.

Lands include the Montecatini, Boccheggiano, Capanne Vecchie, Fenice Massetana and Val di Nievole mines, all very ancient properties, worked successively by the Etruscans, Romans, Goths and Italians. The principal properties are 20 miles from Massa Marittima, the nearest station on the Mediterranean railroad. The Montecatini mines have a brecciated red porphyry, carrying occasional native copper, massive disseminated chalcocite, bornite and chalcopyrite, ores averaging about 3.5% in copper tenor, as mined. Development is by a 125-metre shaft and 5 tunnels, with nearly 10,000 metres of workings, putting about 500,000 tons of ore in sight. The property is equipped with steam power, and has a concentrator with 5 crushers. Production of the Montecatini mine, 1905, was 1,197 metric tons fine copper.

The Boccheggiano mine, which is the principal property, has a quartzite vein with ore in the southern end mainly zinciferous, carrying small quantities of copper and lead, the veins ranging from 13′ to 16′ in width, with a dip of

bout 50° East, carrying paystreaks along the hanging wall. The vein occu-ies a fault between micaceous Permian shales and Eocene limestone, carrying halcopyrite disseminated in pyrite and occasional hematite, with a quartz angue. There also are occasional veinlets of highly argentiferous tetrahedrite. The Boccheggiano carries about 0.05% tin. Development has been difficult, on account of the heavy inflow of thermal waters, at a temperature of 105° Fahrenheit. For 1905 the Boccheggiano yielded 3,138 metric tons of high grade ore averaging 8.88% copper, and 13,158 metric tons of second grade ore aver-aging 3.09% copper, and the mine also produced 441 metric tons of copper precipitate of 69.25% tenor.

The Capanne Vecchie and Poggio Bindo mines are ancient properties, re-opened 1846, since which time they have been small but steady producers. These mines were taken over by the company, circa 1904. The principal vein is 6" to 50' in width, ore being mainly chalcopyrite, which is assorted into first grade smelting ore of about 10% copper tenor, and second grade ore, carrying about 3% copper only, which is heap-roasted and leached. Produc-tion, 1905, was 572 metric tons fine copper, all obtained as precipitate.

The Fenice Massetana mine, also at Massa Marittima, shows ore bodies of 6" to 65' width, apparently lenticular, carrying chalcopyrite associated with pyrite, in a quartz gangue, with occasional sulphides of higher grade. The high grade ore, averaging 10% in tenor, is heap-roasted at the mine, and smelted at Leghorn, and second grade ore, averaging about 3% copper, is heap-roasted and leached at the mine. Production, 1905, was 693 metric tons fine copper, in precipitate, and 94 metric tons fine copper secured by smelting first grade ore.

The Val di Nievole mine carries low grade ores that can be worked profit-ably only when copper prices are high, and this property is idle.

The smelter, at Leghorn, has 4 reverberatory furnaces and a converter plant. In connection with the smelter is a sulphuric acid plant, for the utiliza-tion of the sulphur fumes, the low grade ores of 3.5% copper tenor averaging about 40% sulphur contents.

Production, 1903, was 3,086,440 lbs. fine copper, and 1905 was 5,892,895 lbs. The property is well managed, with a magnificent market at its command, and is likely to prove an increasingly important producer in years to come.

MONTE CRISTO CONSERVATIVE MINING CO. **ARIZONA.**

Mine office: Paradise, Cochise Co., Ariz. Lands, sundry claims, circa 2 miles north of Paradise. Idle several years and apparently moribund.

MONTE CRISTO GOLD & COPPER CO. **UTAH.**

Dead. Formerly at Milford, Beaver Co., Utah. Described Vol. V.

MONTE CRISTO MINING CO. **ARIZONA.**

Office and mine: Metcalf, Graham Co., Ariz. Henry Brigham, president; Refugio Murillo, secretary and general manager. Lands, 5 claims, on Chase Creek, about 2 miles above Metcalf, carrying a fissure vein in porphyry, show-ing 3' to 4' of oxidized ores, assaying up to 45% copper, opened by a shallow shaft and tunnels of 100' and 200'. Made small ore shipments, 1904. Idle several years.

MONTEREY GOLD & COPPER MINING CO.

Dead. Formerly had an office at 11 Broadway, New York.

MONTEREY GOLD MINING CO. **WASHINGTON**

Dead. Formerly at Bolster, Okanogan Co., Wash.

MONTEREY SMELTING & REFINING CO. **MEXICO.**

Works office: Monterey, Nuevo León, Mex. Is controlled by American Smelting & Refining Co. and described under Mexican title of Compañía Minera Fundidora y Afinadora *de Monterrey, S. A.*

COMPAÑIA MINERA FUNDIDORA y AFINADORA DE MONTERREY, S. A. M

Office and works: Monterey, Nuevo León, Mex. Mine offices: de la Mula, Monclova, Coahuila, Mex., and Pánuco de Coronado, San J Rio, Durango, Mex. Arthur K. Brewster, manager; Juan Chiado, supe ent; José M. Padilla, superintendent Pánuco mines. Organized under Mexico, with capitalization increased, 1903, to 8,000,000 pesos. Is co by American Smelting & Refining Co.

Lands include the Ocampo and Santa Elena mines, at Mineral de l carrying auriferous copper and lead ores, and La Cruz y Anexas mi Pánuco de Coronado, carrying argentiferous lead and copper ores.

The smelter, at Monterey, of circa 1,200 tons daily capacity, does tensive custom business, in addition to treating the ores of the com own mines. About 1,500 men are employed, and latest reported prod 1903, was 215,568 lbs. fine copper.

MONTEZUMA COPPER CO. NEW M

Dead. Formerly at Albuquerque, Bernalillo Co., N. M.

MONTEZUMA COPPER MINING CO. ARI

Mine office: Globe, Gila Co., Ariz. Lyman C. Woods, president an ager; Mrs. Lyman C. Woods, secretary; Louis Berndt, treasurer; Chas bush, superintendent. Lands, 17 claims, shortly west of the Live O Inspiration mines, and about one mile west of the Miami, with so similar geological conditions. Lands show porphyry and quartz, with eralized zone of 23′ estimated average width, opened by a 150′ shaft, s carbonate ore assaying about 1% copper and $2 gold per ton. Prop held by A. G. Smith, of Globe, Arizona, under an 18-month bond and running from Aug. 1, 1908, for $150,000.

MONTEZUMA MINING CO. M

Office: San Antonio, Tex. Mine office: Charcas, Moctezuma, Sa Potosí, Mex. C. H. Hoffman, superintendent. Property carries coppe and company was said, 1907, to be employing 75 men.

MONTEZUMA MINING & SMELTING CO. CALIFO

Office: care of Southwestern Securities Co., Los Angeles, Cal. Cap tion $1,000,000, shares $1 par. Lands, supposed to be somewhere i county, California, are claimed to carry gold, silver, lead and coppe Company was claimed, July, 1906, to be paying dividends at rate of 1 annum, on price at which stock was sold. Is regarded with much sus

MONTEZUMA & THE WHIZZERS MINE. SOUTH DA

Office and mine: Deadwood, Lawrence Co., S. D. J. T. Gilmore ager. Lands, 13 claims, patented, area 135 acres, on the divide between wood and Whitewood Cañons, showing Algonkian schists, slates and qua and carrying about 3,000′ of a strong gossan of 45′ estimated average Principal development is on the Whizzers mine, by 2 tunnels, the Mon having superficial development on a parallel quartzite reef. The W was worked for gold, producing circa 30,000 tons of low grade fluxing or to the Golden Reward smelter, at Deadwood. Ore is slightly auriferou copyrite, with gangue of hornblende schist, carrying 0.5 to 1.5% copper, u oz. silver and 50 cents to $2.50 gold per ton. Though low in grade, pr is considered decidedly promising, because of immense tonnage assured.

MONTGOMERY GOLD LEAF MINING CO. NEW JE

Dead. Apparently succeeded by Pahaquarry Copper Mining Co. For in Warren county, New Jersey.

MONTOSA COPPER CO. ARIZ

Mine office: Patagonia, Santa Cruz Co., Ariz. W. H. Thompson, g

'. Lands, in the Tyndall district, at the western end of the Santa ountains, were held formerly by the Calabasas Copper Co., Ltd., a -Lacey swindle. Mine has a 110′ two-compartment shaft, and an ted smelter with a 50-ton water-jacket blast-furnace. Presumably idle.

'ELIER COPPER MINING & SMELTING CO. **IDAHO.**

id. Merged November, 1905, in Bonanza Mining Co. Formerly at lier, Bear Lake Co., Idaho.

REAL & BOSTON CONSOLIDATED **BRITISH COLUMBIA.**
NING & SMELTING CO., LTD.

id. Absorbed by Dominion Copper Co., Ltd. Formerly at Greenwood, ry district, B. C. Fully described Vol. V.

REAL SMELTING & REDUCTION CO. **ONTARIO.**

rks office: North Bay, Nipissing, Ont. E. E. Leonard, president; Brown, vice-president and managing director; Benj. Burlan, treasurer; Cartier, secretary; P. W. Brown, manager. Works, sometimes known North Bay or Trout Lake smelter, said to have cost $700,000, were de- primarily to reduce the argentiferous ores of the Cobalt district, but nned also to smelt copper ores. Blown in Jan. 7, 1908.

IÓN MONTT. **CHILE.**

lce and mine: San Juan, Freirina, Atacama, Chile. Principal prop- are the Quebradita, 300 meters deep, opened 1834; Rosario, 290 meters pened 1864; Manto, 160 meters deep, opend 1846, and San José, 180 deep, opened 1851. Properties have been considerable producers in t, but at last accounts output was practically nil.

MENT COPPER MINING CO. **MONTANA.**

ne office: Dillon, Beaverhead Co., Mont. Organized August, 1902, laws of Montana, with capitalization $75,000. Lands, on Bloody Dick are developed by a 165′ shaft, bottomed in auriferous copper ore, and tunnel, planned to be driven 500′, at which length it should strike a high-grade auriferous copper ore.

'LAATS (NO. 83) COPPER DEVELOPING SYNDICATE, LTD. **NATAL.**

ice: care of E. J. Edmonds, Newcastle, Natal. Mine office: Enton- Zululand, Natal. Chas. Earl, chairman. Organized, 1907, under laws al, with capitalization £5,000, shares £1 par. Property is a lease, with f purchase for £8,000, of the Farm Mooiplaats No. 83, area 6,156 acres.

-ANCHOR COPPER MINING CO. **WYOMING.**

lce and mine: Encampment, Carbon Co., Wyo. L. W. Tennant, presi- nd general manager; W. J. Wernli, secretary and treasurer. Organized nder laws of Wyoming, with capitalization $1,000,000, shares $1 par. 3 claims, area 60 acres, on Green Mountain, in the Upper Platte dis- aid to show a 50′ fissure vein of sulphide ore, giving assays up to 10% developed by a 200′ shaft. Has steam power. Idle.

GOLD MINING CO. **CALIFORNIA.**

lce: Valley Springs, Cal. Mine office: Richey, Amador Co., Cal. J. B. vice-president and general manager. Has shafts of 100′ and 140′. tuff is a sulphide mineralization of diabase and talcose schist, carrying nd copper values. Idle.

LIGHT MINE. **MONTANA.**

wned by Washoe Copper Co.

MERA COPPER MINING CO., LTD. **AUSTRALIA.**

lice: 69 Queen St., Brisbane, Australia. Mine office: Moonmera, Rock- on, Queensland, Australia. T. G. Dewar, secretary; Samuel Phillips, l manager.

nds, 4 leases, area 200 acres, showing 4 ore bodies, of which 2 are partly

developed. Country rocks are sandstone and granite, veins having an a ceous gangue. Gold is found in the oxidized zone, but values turn to co at a little depth, ores being mainly sulphide, with a little oxidized ore some native copper, latter sometimes occurring as flakes and small sh but commonly disseminated in small particles. The property also shows l bodies of low-grade carbonate ores. The ores average 1.75 to 2% co only, but by rejecting about 70% of the ground broken, can furnish 5% to the mill, making concentrates carrying circa 17.5% copper and 9 dwts. per long ton. The mine is opened by shafts of 50′ and 93′, and by 5 tun of 90′ to 280′ length. Idle.

MOONTA CENTRAL COPPER CO., LTD. AUSTRAL

Offices: 30 Moorgate St., London, E. C., Eng., and Adelaide, South A tralia. Mine office: Wallaroo, Daly Co., South Australia. A. Lesser, ch man; John Alex. Russell, secretary; John S. Scott, manager. Organized 29, 1901, as a reconstruction of the Mid-Moonta Copper Mines, Ltd., capitalization £110,000, shares £1 par, in 50,000 cumulative preference shares and 60,000 ordinary shares. Debentures, £1,400 issued, at 10%.

Lands, 152 acres, held under 99-year lease, expiring 1991. Has 4 sha deepest 432′, said to show considerable medium grade ore, with steam po and a small concentrator. Idle since circa 1904, and apparently moribund.

MOONTA SYNDICATE, LTD. AUSTRAL

Dead. Wound up March 5, 1907. Formerly at Moonta, Daly Co., So Australia.

MOORE COPPER CO. ALASI

Office and mine: care of J. R. Heckman & Co., Ketchikan, Alaska. P erty is on the southern arm of Moira Sound. Presumably idle.

MOQUI COPPER CO. VIRGIN

Office: 42 Broadway, New York, N. Y. Mine office: Reager, Rappah nock Co., Va. Is successor of Mannassas-Gap Copper Mines, Inc.

Lands, 700 acres, freehold, including circa 400 acres of timber land Fauquier county, Virginia, 3 and 6 miles from 2 railroads, carrying 2 con veins between Cambrian sandstone and Silurian slates, claimed to range 3 11′ in width, and claimed to give average assays of 5% copper, 10 oz. si and $4 gold per ton, which figures are considered unduly high, from malach bornite and chalcopyrite, associated with a little native copper. Mine about 600′ of workings.

SOCIEDAD ESPLOTADORA DEL MORADO. CHI

Office: Santiago de Chile. Mine office: Freirina, Atacama, Chile. ganized Dec. 22, 1906, under laws of Chile, with capitalization 500,000 p shares 20 pesos par. Property is the Arenillas mine, opened 1860, and a s matting furnace, idle for several years until taken over by present comp

SOCIEDAD MINERA DEL MORADO. CHI

Dead. Succeeded, Dec. 22, 1906, by Sociedad Esplotadora del Mor Formerly at Freirina, Atacama, Chile.

MOREDYKE MINING CO. ARIZO

Office: 404 Jackson Bldg., Denver, Colo. Mine office: Casa Grande, P Co., Ariz. J. R. Smith, president; J. F. Kramer, vice-president; W. H. Ha secretary and treasurer; A. R. Benzie, general manager; preceding officers W. B. LeFave, directors. Organized Sept. 10, 1907, under laws of Ariz with capitalization $1,500,000, shares $1 par. Lands, 8 claims, area 160 a 28 miles from a railroad, showing a 2′ vein of silver-lead ore, with occasi gold values, opened by several pits and a 60′ shaft.

COMPAÑÍA COBRE DE MORELOS, S. A. MEXI

Is the Mexican incorporation of the Royal Morelos Copper Co.

ORENCI COPPER CO. **ARIZONA.**

Dead. Formerly at Morenci, Graham Co., Ariz. Described Vol. V.

ORENCI COPPER MINES, LTD. **ARIZONA.**

Dead. Merged, 1903, in Clifton Consolidated Copper Mines of Arizona, td. Formerly at Morenci, Graham Co., Ariz.

IORGAN-ARGENTINE MINING CO. **UTAH.**

Office: 54 West Second South St., Salt Lake City, Utah. Mine office: eterson, Morgan Co., Utah. Herbert Pembroke, president and general man ger; W. H. Croft, vice-president; A. B. Pembroke, secretary and treasurer; ssie R. Pembroke, engineer; preceding officers, John Croft and S. J. Pem roke, directors. Organized 1900, under laws of Utah, with capitalization 50,000, shares 1 cent par. Annual meeting, third Tuesday in May.

Lands, 10 claims, area circa 175 acres, partly patented, 11 miles from Union Pacific railway, in the Argentine district, showing fissure veins in Carboniferous limestone, and contact deposits between limestone and quartzite. Main vein, of 2′ to 10′ width, with northwesterly strike, carries mainly silver lead ore, with copper and gold values, opened by a 175′ shaft, with circa 2,000′ of workings. Property supposedly is in the same limestone belt as Park City, about 30 miles to the south.

KUPFERBERGWERK MORGENSTERN. **GERMANY.**

Mine office: Kupferberg, Schlesien, Germany. Employs circa 200 men.

MORMON GIRL MINING CO. **ARIZONA.**

Dead. Was a bad egg. Formerly at Cave Creek, Maricopa Co., Ariz. Described Vols. V and VI.

MORNING BELL COPPER MINING & SMELTING CO. **BRITISH COLUMBIA.**

Office: Spokane, Wash. Registered 1907, under laws of British Columbia, a foreign corporation, with capitalization $250,000, shares 25 cents par.

MORNING GLORY MINE. **ARIZONA.**

Office and mine: care of Chas. Wilson, owner, Patagonia, Santa Cruz Co., riz. Mine has a 5′ vein of medium grade sulphide ore, and shipped, 1907, out 1,000 tons.

MORNING STAR MINE. **CALIFORNIA.**

Mine office: Markleeville, Alpine Co., Cal. An old mine, in the Mogul strict, north of Markleeville, showing ores assaying up to 17% copper, 49 silver and $32 gold per ton. Long idle.

MORNING STAR MINING CO. **ARIZONA.**

Dead. Formerly at Dewey, Yavapai Co., Ariz.

MORRIS MINING CO. **WYOMING.**

Office: Morris, Ills. Letter returned unclaimed from former mine office, attle, Carbon Co., Wyo. F. H. Mattison, president; J. R. Collins, vice-president; G. A. Leach, secretary; A. Hollenbeck, treasurer; J. T. Brown, general anager.

Lands, sundry claims, on Nellie Creek, one mile below Battle, adjoining e Continental Copper Mining Co., opened by a 500′ tunnel, said to cut a 15′ ein of copper ore. Also has a 50′ shaft showing a 7′ vein assaying 5% copper. resumably idle.

MORRISON MINES, LTD. **BRITISH COLUMBIA.**

Dead. Absorbed, 1904, by Montreal & Boston Consolidated Mining & melting Co., also dead. Formerly at Greenwood, Boundary district, B. C. ully described Vol. IV.

MORRISON MINING CO. **NEVADA.**

Dead. Name changed, 1907, to Imlay Copper Mining Co. Formerly at Humboldt House, Humboldt Co., Nev.

MORROW COPPER CO. ARIZON

Dead. Was merged, August, 1908, in Clara Consolidated Gold & Copp Mining Co. Formerly at Planet, Yuma Co., Ariz.

MOSCOW MINING CO. UTA

Office: Salt Lake City, Utah. Mine office: Milford, Beaver Co., Uta Mathew Cullen, manager; Daniel Ferguson, superintendent. Mine, 15 mil west of Milford, opened to depth of circa 400', is a small producer of medi and high grade silver-lead and gold-copper ores, averaging about $1,000 p carload in gross values. Shipment of 45 tons, circa May, 1908, returned 12.6 copper and 6% lead, with small silver and gold values.

MOTHER LODE COPPER CO. ARIZONA

Mine office: Prescott, Yavapai Co., Ariz. Organized 1907. Lands, claims, area 140 acres, in the Copper Basin, 10 miles west of Prescott, showin an ore body between limestone and porphyry, said to give average assays circa 12% copper and $6 gold per ton.

MOTHER LODE COPPER MINES OF ALASKA. ALASKA

Office: 902 Lowman Bldg., Seattle, Wash. Mine office: McCarthy Creek Alaska. Clarence L. Warner, president; Joshua Menach, vice-president; Ja A. Godfrey, secretary and treasurer; preceding officers, Chas. G. Hubbard an John Miller, trustees. Organized under laws of Washington, with capitaliz tion $5,000,000, shares $1 par. Lands include 120 acres of placer claims, sai to be well timbered, presumably in the interior of Alaska; claims on Dry Bay, known as the Valdez group, and the Copper River group, 19 claims adjoining the Bonanza group, on McCarthy's Creek, in the Copper River di trict, Alaska, claimed by company to have a better showing than the Bonanza, which statement is not believed. The Copper River group, having a 105 tunnel, is said to show a mineralized zone of 50' to 60' width, carrying 6' to 8' paystreak of massive chalcocite assaying 18 oz. silver per ton, wit small gold values. Company's prospectus is very loosely written, and fille with a vast amount of misinformation regarding general copper condition but property is considered of more than usual promise.

MOTHERLODE COPPER MINING CO. VIRGINIA

Office: 623-18 Broadway, New York, N. Y. Mine office: Virgilina, Hal fax Co., Va. Joseph H. Morong, president and general manager. Organize September, 1902, under laws of New York, with capitalization $1,500,000. Idle

MOTHER LODE MINES. BRITISH COLUMBIA

Owned by British Columbia Copper Co., Ltd.

MOUNTAIN COPPER CO., LTD. CALIFORNIA

Office: 22 Abchurch Lane, London, E. C., Eng. American agency office 811-56 Beaver St., New York, N. Y. Mine office: Keswick, Shasta Co., Ca Works office: Martinez, Contra Costa Co., Cal. Wm. Keswick, M. P., chair man; preceding officer, Sir Andrew Noble, Bart., K. C. B., Henry J. Wenham Sir Walter Scott, J. P., and Chas. W. Fielding, directors; Alfred N. Frewe secretary; Lewis T. Wright, resident manager; W. F. Kett, assistant gener manager; T. J. Jones, mine superintendent; J. A. Black, smelter superintend ent; J. J. Murray, assistant smelter superintendent; W. Cole, railway superi tendent.

Organized Dec. 1, 1896, under laws of Great Britain, and reorganized Ma 10, 1902, with capitalization £250,000, shares £1 par. In 1899 the compan changed its capitalization of £1,250,000 into £250,000 in shares and £1,000,00 in 6% debenture stock, shares £4 par, on which a first repayment of £1 p share was made Jan. 16, 1905, leaving £750,000 of stock now outstandin The change in 1899 was practically a complete amortization. Dividends befo reconstruction, 1897-1901, aggregated 58½%. Profits for 1907 were £150,25

Lands are extensive, including the Iron Mountain and Hornet mines, I

les northwest of Redding. The Iron Mountain mine was worked originally, a small way, for gold and silver values carried in the gossan. The main body of the Iron Mountain mine is a solid pyritic mass, approximately 00' to 400' wide, 800' long and 500' deep, with a gossan of 100' to 300' width. Ore is mainly chalcopyrite, associated with pyrite and pyrrhotite, occurring in a shear zone of meta-rhyolite, the ore averaging circa 5% copper, 2 oz. silver and slightly under $1 gold per ton. The mine was worked pillar-and-stall, and depleted stopes filled with rock, quarried just west of the mine. Considerable ore has been left in the pillars, which undoubtedly will be robbed, eventually, by open-cast work. Ore reserves are estimated at less than 500,000 tons, and diamond drill borings show comparatively little ore outside of the fire zone. The ore being strongly pyritic, there has been considerable trouble from mine fires, caused by spontaneous combustion. In 1902 C. Colcock Jones was engaged as engineer, for the special object of controlling fire conditions, and, as a result of the combined efforts of Messrs. Wright and Jones, the plenum system of ventilation was applied, overcoming heat troubles in the masses of pyritic ore, and restoring normal conditions sufficiently to save a large tonnage of ore. J. J. Shaw, then in charge of underground work, later applied the same ideas, under even more drastic conditions, in the United Verde mine, with like success. Considerable copper is secured by precipitation from the charged mine water coming from the fire zone.

The Hornet mine, lying to the north of the Iron Mountain, has developed about 5,000,000 tons of ore, apparently averaging about 1% only in tenor, though some of the ore carries up to 2.5% copper, all ore being strongly pyritic, ranging 47 to 50% in sulphur tenor.

The mine is connected with the Keswick smelter by an 11-mile narrow-gage electric railway, traversing a rugged country, with an average grade of nearly 2%, the elevation gained being 2,000'.

Ore is heap-roasted in open air, 8 to 10 weeks being required for burning, raw ore carrying about 45% sulphur and roasted ore only 7%. The roasted ore is loaded by steam-shovel.

The Keswick smelter, in the cañon of Spring Creek, less than a mile from the Sacramento river, does considerable custom smelting. The plant has 5 water-jacket blast-furnaces, of 300 tons daily capacity each, with 11 Wright circular calcining furnaces having settlers with slag overflow to ladle cars, and a slag railway, the matte pouring into iron casting-moulds on a slow-moving belt-conveyor, and passing under jets of water to chill the pigs, which are dumped into barrows and hoisted to the charging floor. The first-fusion matte, of 25 to 30% copper tenor, is resmelted, and the second-fusion matte roasted and blown up to white metal, running into settlers, and being taken thence, in ladles, by traveling crane, to the converters. Stands are controlled hydraulically, from a single pulpit, and linings are tamped by power. Fumes from roasters, furnaces and converters are carried through dust-chambers, and flue-dust is briquetted and resmelted. Fines and ores from the roast-heaps are calcined in Wright turret roasters, and briquetted by 3 machines, which also handle flue-dust and calcined granulated matte, using lime for a binder.

The power plant of the Keswick smelter includes rotary blowers, driven by 3 engines, including an Allis-Chalmers cross-compound, Risdon cross-compound and a small auxiliary straight-line engine, steam being furnished by 3 Babcock & Wilcox boilers and a Heine water-tube boiled, all fired with petroleum. Blast is heated by stoves fired with oil, before entering the tuyeres. The converter plant has an air-compressor driven by a 500-h. p. Allis-Chalmers engine. Electric power, generated 80 miles distant, is used, at a cost of ¾ cent per h. p.-hour. In connection with the smelter are a large machine shop, foundry and smithy.

The operation of the Keswick smelter has been greatly hampered by s of neighboring ranchers, and the plant was idle for some time, on account this trouble. The company has withdrawn its appeal from an adverse deci in the case of a suit for damages brought by the United States governm for injury done to federal lands, and the company has promised to pay d ages to the government.

The Keswick smelter is not modern, and doubtless would be rebuilt w there sufficient ore in sight to justify such an expenditure. The results cured, however, are unusually good, and this plant stands second only to works of the Mount Lyell as a successful pioneer in the field of pyritic sm ing. After idleness for a long period, the roasters were started, circa Mar 1908, to treat fines from the mines, before shipment to the Martinez smelt

The Martinez smelter, on San Francisco Bay, includes the old works the San Francisco Chemical Co., taken over as the nucleus of the new pla The Martinez works have one of the most extensive and best planned a works in existence, built at a cost of approximately $1,000,000. The Hor ores, which are low in copper, but rich in sulphur, are burned, and the sulph fumes collected in lead-lined chambers and transformed into sulphuric a by the contact process, and the cinder remaining after the roasting is leach for its copper contents. The acid is sold crude, and also is used as the ba of commercial fertilizers, for which there is an enormous demand in the ri fruit and agricultural districts of California and the other Pacific coast stat The Martinez works have a smelting capacity of 350 tons daily, and also a general custom business.

Production of the Iron Mountain mine has greatly decreased, figures output in fine copper being as follows: 29,727,040 lbs. in 1901; 19,116,160 l in 1903; 5,708,000 lbs. in 1906; 6,814,000 lbs. in 1907. In October, 1908, t Iron Mountain mine was shipping 100 tons daily, with a considerable prod tion of cupriferous pyrites from the Hornet mine. Notwithstanding the dep tion of the company's reserves of medium and high grade ore, the finan have been managed with great prudence and marked success, and the co pany, while facing a partially exhausted mine, has been able to make a s cessful change of base, by which low grade pyritic ores are utilized for a making, and the company is in excellent condition financially.

MOUNTAIN GEM MINING CO. MONTAN

Office: care of W. D. Greenough, Wallace, Idaho. Mine office: Salte Missoula Co., Mont. Organized late in 1907.

MOUNTAIN HOME COPPER CO. AUSTRAL

Mine office: Cloncurry, Beaconsfield Co., Queensland, Australia. A c siderable share interest is said to be owned by Queensland Copper Freeho Ltd. Lands are circa 600 acres.

MOUNTAIN KEY MINE. NEW MEXI

Office: Pinos Altos, Grant Co., N. M. W. C. Chandler, owner and m ager. Property is one of the oldest mines in Grant county, having a 700' sh and producing auriferous and argentiferous copper sulphides. Has ste power. Presumably idle.

MOUNTAIN LAKE CONSOLIDATED MINING CO. UT

Office: Provo, Utah. Mine office: Brighton, Salt Lake Co., Utah. Je Knight, president. Organized circa 1906, under laws of Utah, as successor Mountain Lake Mining Co.

Lands include the Original group, 24 claims, area circa 400 acres, and Mountain Lake Extension, an adjoining property, bought circa April, 19 The Original group, at the head of Big Cottonwood Cañon, adjoining the Cottonwood Gold & Copper Co., shows 2 contact deposits, between diorite a *limestone*, of 100' claimed average width, traceable circa 2,000', carryi

nite and chalcopyrite, giving average assays of 2.5% copper, 2 oz. silver \$1 gold per ton. Development is by a 100′ shaft and 5 tunnels, longest, wn as the Steamboat tunnel, circa 2,500′.

UNTAIN LAKE MINING CO. **UTAH.**

Dead. Succeeded, circa 1906, by Mountain Lake Consolidated Mining . Formerly at Brighton, Salt Lake Co., Utah. Fully described Vol. VI.

OUNTAIN LION GOLD & COPPER CO. **MEXICO.**

Letter returned unclaimed from former office, La Cananea, Sonora, Mex. rganized 1905, with capitalization \$50,000. Lands were circa 400 pertenenas, in the Magdalena district of Sonora. Moribund.

IOUNTAIN MEADOWS COPPER CO. **CALIFORNIA.**

Mine office: Quincy, Plumas Co., Cal. Property, in Lights Cañon, has a 00′ tunnel, said to show native copper.

MOUNTAIN MONARCH GOLD MINING CO. **CALIFORNIA.**

Office: 319 Yuba St., Redding, Cal. Mine office: Shasta, Shasta Co., Cal. W. F. Aram, president and general manager; J. H. Hunter, secretary; C. E. Armstrong, treasurer. Organized Nov. 25, 1905, under laws of California, with capitalization \$75,000, shares \$1 par, in \$25,000 preferred and \$50,000 common stock; issued, \$68,500.

Lands, 11 claims, unpatented, area 220 acres, in the Whiskeytown district, north of Redding, 10 miles from Southern Pacific railway, showing 3 fissure veins in rhyolite, main vein, of 140′ estimated width, traceable circa 2,500′, carrying malachite, bornite and chalcopyrite associated with pyrite, giving average assays of 7% copper, 1.5 oz. silver and \$3.40 gold per ton. Development is by tunnels of 200′ and 750′, with 1,200′ of workings. Equipment includes a 6,000′ sawmill and 5 mine buildings. Company plans extension of main tunnel.

MOUNTAIN RUN MINE. **AUSTRALIA.**

Mine office: Rockley, N. S. W., Australia. Has shafts of 120′ and 180′, and at last accounts was erecting a smelter with a small water-jacket blast-furnace.

MOUNTAIN VIEW COPPER CO. **OREGON.**

Dead. Lands sold, 1903, to Vulcan Copper Co. Formerly at Kerby, Josephine Co., Ore.

MOUNTAIN VIEW DEVELOPMENT CO. **ARIZONA.**

Letter returned unclaimed from former mine office, Bisbee, Cochise Co., Ariz. Geo. Bennett, president; H. M. Woods, vice-president; W. D. Kinsey, secretary; Chas. Trotman, treasurer. Organized 1903, under laws of Arizona, with capitalization \$1,000,000, shares \$1 par. Lands, 9 claims, 4 miles northwest of Bisbee, opened by 2 shallow shafts and a tunnel. Ores carry occasional lead values, and a small test shipment gave returns of 16.74% copper and 100 oz. silver per ton. Idle and apparently moribund.

MOUNTAIN VIEW MINING CO. **UTAH.**

Dead. Property sold, 1908, to Yankee Consolidated Mining Co. Formerly at Eureka, Juab Co., Utah.

MOUNT ANDREW MINING CO. **ALASKA.**

Office: 1500-52 William St., New York, N. Y. Mine office: Ketchikan, Alaska. Property, leased to Britannia Smelting Co., Ltd., is described under title of that company.

MOUNT BAKER & SHUKSAN MINING CO. **WASHINGTON.**

Office: 18 Post-Intelligencer Bldg., Seattle, Wash. Mine office: Maple Falls, Whatcom Co., Wash. J. Conaway, president; C. M. Welsh, secretary; Geo. B. Conaway, superintendent. Lands, 320 acres, having an available water power and said to carry 7,000,000′ of good standing timber. Has 4 tunnels, longest 320′, with about a quarter-mile of workings, showing ore said to

MOUNT EDDY MINING & DEVELOPMENT CO. **CALIFORN**

Dead. Formerly at Sisson, Siskiyou Co., Cal.

MOUNT ELLIOTT, LTD. **AUSTRAL**

Offices: Palmerston House, Old Broad St., London, E. C., Eng., and Collins St., Melbourne, Australia. Mine office: Selwyn, Cloncurry, Beace field Co., Queensland, Australia. E. Habben, London secretary; E. H. Schack Melbourne secretary; G. A. Walker, general manager. Organized June 1907, under laws of Great Britain, with capitalization £750,000, shares £1 pa issued, £600,000, as reconstruction of a corporation of same name organiz 1906, under laws of Victoria.

Lands, 260 acres, 58 miles south of Cloncurry, on the 2 upper branches Maggie's Creek, a tributary of the Cloncurry River. Has a townsite call Selwyn, one-half mile north of the mine. Lands show a big outcrop of ri ore, in an area of pre-Devonian upturned slates and schists, there being t usual oxidized ores, with considerable chrysocolla and a fine showing of chalc cite. Main shaft is 231', sunk at an angle of 65°. Ore reserves estimate August, 1907, at 71,000 long tons, first estimated to average 25% copper, bu after resampling, estimated to carry 16.4% copper and 2 dwts. gold per ton which figures still seem high, though ore shipped, 1907, assayed 37% copper, oz. silver and 9 dwts. gold per ton. A railway is projected to reach the mine and it is planned working the property open-cast to depth of 135'.

Smelter, built 1907-1908, has a water-jacket blast-furnace. Production, 1906, was 182 long tons of high grade copper ore, yielding circa 140,000 lbs. fine copper. Property considered decidedly promising.

MOUNT FISHER PROPRIETARY CO. **AUSTRALIA.**

Office: 114 Pitt St., Sydney, N. S. W., Australia. H. Ernest A. Miller, secretary. Idle and apparently moribund.

MOUNT FLORA COPPER CO. **AUSTRALIA.**

Mine office: Mackay, Queensland, Australia. Lands, 300 acres, in three 100-acre tracts, known as the Mount Flora, Wallaroo and Eastern Selections, opened by a 140' shaft on the Wallaroo vein, said to be 18' in width, surface ores being melaconite, azurite and malachite, with some native copper, bottom of shaft carrying chalcopyrite, ores shipped ranging 15.5 to 43.5% in copper tenor. Property also has a number of other copper veins. Begun 1908 with indebtedness of £2,250, and it was planned, February, 1908, to form a local company, with capitalization of £12,000, and build a smelter.

MOUNT FRASER COPPER MINES (N. S. W.), LTD. **AUSTRALIA.**

Dead. Voluntarily wound up, June, 1902. Formerly at Springfield, Bathurst Co., N. S. W., Australia.

MOUNT GARNET & CHILLAGOE EXPLORATION CO., N. L. **AUSTRALIA.**

Dead. Formerly at Mt. Garnet, Queensland, Australia.

MOUNT GARNET FREEHOLD COPPER & SILVER MINING CO., LTD. **AUSTRALIA.**

Dead. Company liquidated, and property taken over by bondholders. Formerly at Mt. Garnet, Queensland, Australia.

MOUNT GARNET RAILWAY & FREEHOLD MINES. **AUSTRALIA.**

Dead. Voluntarily wound up, 1903. Formerly at Mt. Garnet, Queensland, Australia.

MOUNT GLASSFORD COPPER CO. **AUSTRALIA.**

Mine office: Glassford Creek, via Miriam Vale, Queensland, Australia. Has expended circa £1,250 in exploratory work on claims adjoining the Glassford Creek mine, finding a little copper ore of fair grade. Out of funds and idle at last accounts.

MOUNT GLINES GOLD & SILVER MINING CO. **MAINE**

Mine office: Bryant Pond, Oxford Co., Me. W. N. McGrillis, superin

it. Property shows auriferous and argentiferous copper and lead ores. team power and a small mill. Presumably idle.

NT GODDARD COPPER MINING CO. **CALIFORNIA.**

ffice: Fresno, Cal. Property is located in San Bernardino Co., California. idle and apparently moribund.

NT GUNSON MINING CO. **AUSTRALIA.**

line office: Pernatty Lagoon, South Australia. Works office: Port Au-, South Australia. Lands, 460 acres, one mile west of Pernatty Lagoon, les southeast of Mount Gunson, and circa 90 miles northwest of Augusta. Property, discovered 1875, and worked in an exceedingly small before present ownership, shows 2 practically parallel ore bodies, of 6′ to idth, with a northeasterly strike, carrying malachite, azurite and tetra-te, giving average assays of about 26% copper. The old mine shows car-te impregnations in practically horizontal beds of quartzose sandstone, adjoining seams and cracks carrying copper carbonates and chalcocite. any was said, 1905, to have built a small reverberatory smelter. Property dered promising.

NT HECTOR COPPER MINES, LTD. **AUSTRALIA.**

Office: William St., Rockhampton, Queensland, Australia. Mine office: ford Creek, Queensland, Australia. Thos. Gibb, managing director; A. A. , secretary; Matthew Caldwell, mine manager; Clifton-G. Rutledge, er superintendent. Capitalization £25,000, shares £1 par, divided equally full-paid and half-paid stock. Lands, 346 acres, 7 miles north of Glass-Creek, and 29 miles from a railroad, in the Monal Goldfield, showing rocks vonian age. Mine has a tunnel and a 270′ shaft, and also is worked open-producing auriferous and slightly argentiferous copper ores. Smelter, in, 1907, has one 20-ton reverberatory furnace, producing matte of about copper tenor. Production, 1907, from circa 3,000 tons of ore treated, was ons of 55% matte, carrying circa 325,000 lbs. fine copper. Employs about n.

NT HOPE COPPER PROPRIETARY. **AUSTRALIA.**

ffice: 114 Pitt St., Sydney, Australia. Mine office: Mount Hope, Blax-Co., N. S. W., Australia. H. Ernest A. Miller, agent. Organized 1904, laws of New South Wales, as successor of New Mount Hope Copper g Co., N. L.

ands, circa 600 acres, freehold, well watered, about 90 miles south of and 80 miles west of Condobolin. District is subject to drought, but provision is made for the conservation of water, there being 2 dams, of cubic yards aggregate storage capacity.

he property has had a somewhat checkered career, since opened in 1880, as been closed down and reopened fully a half dozen times. The mine ced upwards of $500,000 worth of copper, to the end of 1901.

he property shows altered sandstone, carrying 3 parallel outcrops of grained ferruginous slates, and quartz seams with silicious sulphide ore ng 4.5 to 7% in copper tenor, as broken in the stopes. Above 250′ the re oxidized, being mainly earthy carbonates, and a considerable amount idized ore remains available in the upper workings. The ore shades into walls, which are impregnated for some distance, the main ore body g an extreme width of 80′. The property resembles the Great Cobar in respects.

Development is by a 400′ main shaft, showing on the bottom level a 30′ with some stopes of 30′ to 50′ width, ore occurring in chutes of 200′ to length.

Equipment includes a fair machinery plant, with reduction works having ock jigs making *concentrates of 15 to 25%* copper tenor. The smelter has

4 reverberatory furnaces, formerly making rough copper of about 96% tene but planned, at last accounts, to turn out high-grade blister copper. Flux iron ore, secured from a quarry 12 miles from the mine. Forces are abo 85 men. Production, 1878-1898, inclusive, was 5,070 long tons fine copper, a for 1906 was 485,280 lbs. fine copper, valued at £14,672.

MOUNT HOPE COPPER MINES CO. AUSTRALI

Mine office: Cloncurry, Beaconsfield Co., Queensland, Australia. Orga ized circa 1906, under laws of Queensland, with capitalization £30,000. Lan include the Mount Hope, Mount Hope North, Regina and Aurum mines, a leasehold, showing 2 veins, of which No. 1 vein is said not to be payable, whi No. 2, in schist, carries chalcopyrite. Property was idle, late 1908, with months exemption from labor conditions.

MOUNT JUKES PROPRIETARY MINING CO., N. L. TASMANIA

Office: care of T. L. Hood, agent, Hobart, Tasmania. Lands are in th Mt. Jukes field, Tasmania. Idle and apparently moribund.

MOUNT LYELL ANACONDA MINING CO., N. L. TASMANIA

Office: 60 Queen St., Melbourne, Australia. Mine office: Mt. Lyell Montagu Co., Tasmania. N. Madden, manager. Organized under laws o Victoria, with capitalization £50,000, shares 10s. par; fully issued. Lands, 3 acres, leasehold. Idle some years.

MOUNT LYELL BLOCKS COPPER CORPORATION, LTD. TASMANIA

Dead. Reorganized, 1903, as Mt. Lyell Blocks Mining Co., N. L. For merly at Mt. Lyell, Montagu Co., Tasmania.

MOUNT LYELL BLOCKS MINING CO., N. L. TASMANIA

Offices: 47 Queen St., Melbourne, Australia, and Palmerston House, Lon don, E. C., Eng. Mine office: North Mount Lyell, Montagu Co., Tasmania Employs, normally, about 250 men. Colin Templeton, chairman; preceding officer, Alfred Tolhurst, Thos. Harvey and Alex. Campbell, directors; Thos Rollason, secretary; Edwin Habben, London secretary; Robert Ferguson, gen eral manager. Organized March 20, 1908, under laws of Victoria, as a recon struction of Mount Lyell Blocks Copper Corporation, Ltd., with capitalizatio £300,000, shares £1 par; paid in, 19s. 9d. First half of 1907 made a profit o £3,247. Half yearly meetings, February and August.

Lands, 317 acres, including 17 acres held under mineral lease, 60 acre timber lands, 150 acres miscellaneous lands and a millsite. In addition th company has the right to mine on adjoining lands of the Mount Lyell Consol for 7 years, on a royalty of 40% of net profits.

The property shows two ore bodies, carrying native copper, in minut particles, disseminated quite evenly through argillaceous schists, locall termed clays, as the schists are very soft and weather readily. These or bodies were estimated to carry 3% copper, but revised figures, 1906, gave aver age estimates of 2.15% copper, and, as a matter of fact, the average probabl is about 1% copper. Development is by the 240′ Balance shaft and 250′ Mai shaft, and by the Consols tunnel of 1,638′ and the Office tunnel of 680′, min being estimated to show 100,000 long tons of ore. The ground is very soft turning to clay when weathered, and is exceedingly treacherous, requiring heavy timbering and constant watchfulness.

In addition to the two schistose ore bodies, the property shows sulphid ores giving assays up to 6% copper, in a 30′ bed of conglomerate, but this ha not been worked for some time.

The company also holds options on lands in the Mount Darwin distric Tasmania, on which some prospecting work was done, 1907.

Miscellaneous improvements at the mine include a small sawmill, and framing mill for mine timbers. The Mount Lyell & North Mount Lyell Ra way is 5 miles distant. Fuel is wood, costing 10s. per cord.

The 350-ton concentrator begun work August, 1904, and gave very unsatisfactory results at first, but has done better latterly, after some minor changes. The mill, of steel frame, has 10 gravity stamps, 20 Wilfley and Phoenix-Weir tables, canvas tables and 12 Frue vanners. The ore is concentrated quite easily.

During the first half of 1905 the mine showed a working profit of £1 11s. 11d., and at the end of 1905 was treating circa 1,000 tons of ore weekly, making 15 to 20 tons of fine copper therefrom. At last accounts the mine was practically closed, on account of the low price of copper. Mr. Ferguson seems to be handling a hard proposition with skill and technical ability.

MOUNT LYELL COMSTOCK COPPER CO., LTD. TASMANIA.

Offices: Alderman's House, Bishopsgate, London, E. C., Eng., and Broken Hill Chambers, 31 Queen St., Melbourne, Australia. Mine office: Mount Lyell, Montagu Co., Tasmania. Works office: Pillinger, Macquarie Harbour, Tasmania. T. J. Ive, chairman; Chas. Alfred Sack, secretary; Geo. A. Moore, manager. Organized June 1, 1907, under laws of Great Britain, with capitalization £150,000, shares 4s. par; issued, £105,066 8s., with 2s. 6d. per share paid up. Was organized as a reconstruction of the Lyell Comstock Consolidated Copper Co., Ltd., which was a reconstruction of the Mount Lyell-Comstock Copper Co., Ltd., thus changing back to the original title.

Lands, 300 acres, on Mount Lyell, considered fairly located, showing a considerable amount of ore of low to medium tenor. Some boring was done, 1908, by a petrol drill.

Development is by the Central tunnel, showing ore assaying 3.7% copper, and by a 450′ main shaft, with levels opened at depths of 50′, 137′, 163′, 250′, 325′ and 425′, which is poor mining practice. The main shaft shows a fissure carrying ore said to give average assays of 6.8% copper, 5.7% tin and 25 oz. silver, which figures seem large. The property, as a whole, shows considerable ore of low to medium grade, best ore averaging circa 4.5% copper. A tramway is built to within 2 miles of the mine. Company employs circa 15 men.

MOUNT LYELL COMSTOCK MINING ASSOCIATION, N. L. TASMANIA.

Dead. Was succeeded by Mount Lyell-Comstock Copper Co., Ltd. Formerly at Mount Lyell, Montagu Co., Tasmania.

MOUNT LYELL CONSOLS, N. L. TASMANIA.

Dead. Was succeeded, July, 1906, by Mount Lyell Consols Mining Corporation, N. L. Formerly at North Mount Lyell, Montagu Co., Tasmania. Described Vol. VI.

MOUNT LYELL CONSOLS EXTENDED MINING CO., N. L. TASMANIA.

Dead. Formerly at North Mt. Lyell, Montagu Co., Tasmania.

MOUNT LYELL CONSOLS MINING CORPORATION, N. L. TASMANIA.

Offices: 47 Queen St., Melbourne, Australia, and Palmerston House, London, E. C., Eng. Mine office: North Mount Lyell, Montagu Co., Tasmania. Arthur J. Price, chairman; preceding officer, Wm. P. Jarvie and Wm. Colman, directors; Thos. Rollason, secretary; Edwin Habben, London secretary; Henry Doyle, mine manager. Organized July, 1906, under laws of Victoria, with capitalization £93,750, shares 7s. 6d. par, fully issued and fully paid. Authorized, June, 1908, a £15,000 debenture issue.

Lands, 78 acres, leasehold, on Mount Lyell, south of the Mount Lyell Blocks, and 40 acres at Mount Darwin, Tasmania, though lease on latter possibly forfeited.

The Mount Lyell property has a 90′ shaft, near the mouth of No. 2 tunnel, showing a gossan said to carry native copper. Principal development is by 2 tunnels, driven in hope of striking a continuation of the sulphide ore body worked in the adjoining North Mount Lyell mine. Circa 600′ south of the shaft is a body of *cupriferous clay, similar to that of* the Mount Lyell Blocks,

outcropping for 900', with an average overburden of 6', estimated approximately 700,000 tons of ore, and management estimated Jan. that there was in sight 94,117 long tons of cupriferous clays, of al average copper tenor.

The mill, completed October, 1907, of circa 200 tons daily capaci stamps, puddling machines and Wilfley tables, water being secure pumping plant at Linda Creek. The property employed 12 men, pr May, 1908, when all hands were discharged, on account of financial st

MOUNT LYELL CONSOLS REGISTERED, N. L. TAS

Dead. Formerly at North Mt. Lyell, Montagu Co., Tasmania.

MOUNT LYELL COPPER ESTATES, LTD. TAS

Office: 85 Gracechurch St., London, E. C., Eng. Mylius Cohe man; F. W. Eccardt, secretary. Organized July 19, 1899, under laws Britain, with capitalization £150,000, shares £1 par; issued, £103,435. 4 leases, on Mt. Lyell, were abandoned. Dead, for all practical purp should be buried.

MOUNT LYELL EXTENDED CO., N. L. TAS

Offices: 138 Leadenhall St., London, E. C., Eng., and Equitabl Collins St, Melbourne, Australia. Mine office: Mt. Lyell, Mont Tasmania. M. Gilmore, mine manager; J. P. Madden, secretary in M H. M. Taylor, secretary in London. Capitalization £150,000, shares Lands, 30 acres on Mt. Lyell and 80 acres on Mt. Darwin. Lands, circa 1906, and bid in by company's local agent, for £505.

MOUNT LYELL EXTENDED MINING ASSOCIATION, N. L. TAS

Dead. Was succeeded by Mount Lyell Extended Co., N. L. For Mt. Lyell, Montagu Co., Tasmania.

MOUNT LYELL MINING & RAILWAY CO., LTD. TAS

Offices: 39 Queen St., Melbourne, Australia, and Palmerston H Broad St., London, E. C., Eng. Operating office: Queenstown, T Mine office: Gormanston, Montagu Co., Tasmania. Employs circa 2, Bowes Kelly, chairman; Hon. Wm. Knox, M. P., vice chairman; officers, Wm. Jamieson, Jos. Cowen Syme and Lindsey Tullock, dire Williamson, J. Dowling, Sir John A. Cockburn, K. C. M. G., and J Ball, directors London Board; Robt. C. Sticht, general manager; Alfre secretary; Edwin Habben, London secretary; R. M. Murray, eng charge of mine; A. Lewis Dean, metallurgist; W. H. Wesley, assista lurgist; G. W. Wright, mechanical engineer; P. A. Mackay, manager works; E. Carus Driffield, railway superintendent; Dr. F. J. Howell, tendent; Hon. B. Stafford Bird, Tasmanian agent; A. G. S. Willi Thos. Woodward, auditors.

Organized Aug. 11, 1903, under laws of Victoria, as a merger o company of same name with North Mount Lyell Copper Co., L capitalization £1,300,000, shares £1 par; issued, £1,200,000. Deben £140,000, at 5%, were retired, 1908, leaving the company without bon Dividends were £150,000 in 1904; £205,000 in 1905; £285,000 in 1 £330,000 in 1907. Company and its predecessors paid dividends, t 1907, of £1,966,574. Balance of liquid assets, March 31, 1908, was Half yearly meeting, May; annual meeting, November.

Lands, 4,108 acres, including 3 consolidated leases and a large n ordinary leases from the crown, for 20-year and 30-year periods, acres of mill and smelter sites, 17 miles southeast of Zeehan, in t Coast mining district of Tasmania. The company also holds an optio Tasman & Crown Lyell property, and is prospecting in other mine and holds, outright and under option, 1,368 acres of tin-bearing l addition to damsites and water rights of circa 900 acres area. The

from the smelter, and are connected therewith by surface and

Lyell mine was discovered 1883, and the gossan was worked, in as a gold mine, until taken over by the predecessor of the present 1892. The North Lyell mine was developed in 1897.

rocks are schist, conglomerate, quartzite and sandstone, ore ring as massive lenses in the schist, near conglomerate contacts, ving a generally NW. and SE. trend. There are 15 known lenses, are under development, these having average dimensions, at the ine, of 270′ width, 660′ length, and a proven depth of 730′, and Mt. Lyell mine, 100′ width, 180′ length and 600′ proven depth.

two varieties, the Mt. Lyell ores consisting of massive pyrite seminated bornite and chalcopyrite, with average values of 2.18% oz. silver and 0.055 oz. gold per long ton, while the North Mt. carries silicious sulphide ores, including chalcocite, bornite and , with quartzose schist gangue. There are occasional occurrences pper and tetrahedrite, but the ores of commercial importance are sively sulphide. In addition to the ores previously enumerated, ll has large bodies of very low-grade sulphide ores, averaging circa r, 2 oz. silver and 0.0725 oz. gold per ton, which doubtless will able in time. The North Mt. Lyell ores are higher in copper those of the main mines, but are decidedly refractory, unless ked, carrying 15 to 20% alumina and 60 to 75% silica. An lysis of ores, made circa 1903, gave, in addition to copper, silver tents, 40.3% iron, 46.5% sulphur, 4.4% silica, 2.5% barium sulphate mina.

unt Lyell mine proper is developed by tunnels of 320′ and 1,450′, blind shaft, and has circa 15 miles of workings, with estimated of upwards of 1,000,000 long tons available for open-cast extrac- wards of 2,100,000 long tons available for underground extraction. lone open-cast, in terraces, at the Mount Lyell and its principal mines, underground extraction at these properties being confined the removal of the richer patches of ground encountered during . A traveling crane is used in open-cast mining. The overburden nt Lyell main ore body is estimated at 1,500,000 cubic yards, all ust be stripped, eventually. The mine is lighted by electricity, ond drills are employed, steadily, in exploratory work. A little er is secured by leaching the charged mine waters.

rth Mount Lyell mine is a comparatively small property, though excellent average grade, showing considerable bornite of better verage copper tenor. Development is by 2 shafts, known as the uxiliary, former 1,122′ and the latter 1,000′ in depth, both being , with tunnels of 850′ and 1,080′ length. Stoping is mainly on the 0′ levels, with promising developments under way on the 1,000′ being driven at 150′ intervals. The ore body is variable in size, t at the fourth level, but showing a 60′ stope below. The North the richest produced in Tasmania, but is refractory in smelting, ed with the basic ores of the Mount Lyell.

to extraction of ore largely by tunnel and from quarries, the at the mine is of only 300 indicated horsepower, taking energy electrically from the main power plant at the smelter. There including an Ilgner electric engine, and 2 Corliss cross-compound rs of 40 drills aggregate capacity.

s include 13 smithies, of various sizes, a 40x50′ machine shop, nter shop, *boiler and compressor-house*, engine-house, warehouse,

office, locomotive roundhouse and numerous dwellings for employes. The c pany also owns and operates three sawmills, at various points, for the prep tion of mine timber, and lumber for general building purposes. In addit to the ore mines there are extensive silica and limestone quarries, with a cr ing plant, near the reduction works.

The mines are connected with the Queenstown smelting plant by aerial tramway and counterbalanced inclines, surmounting the intervenin hills, the tramway being of 1,500 long tons daily capacity.

The company has two private railroad systems, of 31 and 38 mil respectively, also a 24" gauge line, with 6 locomotives, connecting the min flux quarries, smelters, warehouses and yards. The 31-mile line, of 42" gau runs from the smelter at Queenstown to the seaport of Strahan, with extensi wharves on Macquarie Harbor, connecting at the latter point with the Str han-Zeehan government line, giving rail connections with all parts of t colony. The Queenstown-Strahan line traverses an exceedingly difficult cou try, 4½ miles of this line having gradients of 1 in 20 and 1 in 16, employi 4 special Abt type locomotives and centre-rack railway, in addition to ord nary adhesion engines. The company's private lines have 238 cars, and a good general business, in addition to handling the company's traffic.

The 250-ton North Lyell smelter, 28 miles from the mine, is 75x210' size, with four 16x32' reverberatory furnaces, 4 blast furnaces and a co verter plant. The North Lyell works also have a 69x72' sampling mill, 41x6 boiler-house with three 250-h. p. Stirling water-tube boilers, and a 60x10 power-house with 200-kw. generators and cross-compound blowers. This plan is idle, and likely to remain out of commission permanently.

The Queenstown smelter, on the Queen river, 1¼ miles from the mine receives ore by aerial tram and counterbalance inclines. This plant, whic also treats custom ores, is in 2 sections, known as Nos. 1 and 2, latter bein the principal plant. No. 1 smelter has 5 water-jacket blast-furnaces, 40x16 at the tuyeres, and No. 2 has 6 water-jacket blast-furnaces, 32x127" at th tuyeres and 20' in height over all, all furnaces having cast-iron water-jacket while a twelfth furnace, of greater capacity, was added to No. 2 plant, i 1908. The capacity of the 6 furnaces in No. 2 smelter is circa 2,000 ton daily. No. 2 smelter has mechanical feeders, and the two grades of ore fro the two principal mines afford an excellent furnace mixture. A 48-oz. blas formerly was supplied by 9 No. 8 Root blowers, and 3 No. 7 Root blowers each driven by a 12x22x28" direct-connected compound condensing vertic engine, but these were replaced, circa 1908, by 2 large steam turbo blowers of 36,000 cubic feet capacity each, with a pressure of 4 lbs., and a simila smaller turbo blower of 18,000 cubic feet capacity per minute, at the same pressure. Blast is heated by 8 hot-blast stoves, of the hanging U-pipe typ

Pyritic smelting is employed for the first fusion, which gives a 15% matte, showing a concentration of 6 into 1, with slags averaging 46% iron 38% silica and only 0.3% copper. The low-grade first-fusion matte is blown up, to a tenor of 40 to 50%, without previous calcining, in a small hot-blast furnace, using only a 5% coke charge, the consumption of coke amounting, 1906, to about 120 lbs. per long ton, or practically 5%.

In front of the furnaces are 4 rectangular forehearths, slag and matte flowing into the first and slag skimming from the fourth into a stream of running water, granulating the slag, which is carried to a pit, whence centrifugal pumps raise it to a launder running to the slag-dump. Matte is tapped from the first forehearth three times hourly, and from the others also every two hours.

The 75-ton converter plant has 2 remelting furnaces, 6 stands and Stahlmann shells, each 60x96". Converter blast is furnished by two 16x24x2

ound condensing air-compressors. The final product is blister copper aging 98.83% copper, 100 oz. silver and 3.21 oz. gold per long ton, sent he United States for electrolytic refining.

The power plant at the smelter has twelve 125-h. p. Babcock & Wilcox ers, and 16 multitubular boilers, with aggregate steaming capacity of 0 h. p. There is a Green fuel economizer with induced draft, and super ters, the joint use of the various steam economies effecting a saving of % in fuel costs. The electric plant, of 1,200 h. p., includes 2 Brown-Boveri sons steam turbines, direct-connected to generators, and a complete electric t plant.

Fuel is mainly cordwood costing 8 to 11s. per long ton, with a little soft l costing circa 27s. per ton, and coke costing 30s. per long ton. Yearly sumption of fuel is 67,500 tons of firewood, 42,200 cords of cordwood, 2,500 s of bituminous coal and 10,000 tons of coke.

The company owns and operates coke works at Port Kembla, N. S. W., stralia, these having 62 funnel-shaped ovens. The coking plant does a neral custom business, in addition to meeting the company's requirements.

Miscellaneous enterprises include a machine shop, iron foundry, brass undry, brickyard and 3 sawmills.

The company built, 1905, at Yarraville, a suburb of Melbourne, Australia, acid and fertilizer plant that makes sulphuric acid from the low grade piferous pyrites of the Mount Lyell mine.

A second acid and fertilizer plant at New Birkenhead, Port Adelaide, uth Australia, was put in commission Apr. 1, 1908. The basis of the Port lelaide plant is the old Junction smelter, which has been remodeled and atly enlarged. These works are built of timber and roofed with rubberoid, order to withstand the strongly acid fumes. The plant has 6 Herreshoff rnaces, each discharging into hoppers at the bottom, fumes going by flue to ad-lined acid-chambers, where, by the agency of nitrous gases and steam, e fumes are condensed and made into dilute sulphuric acid, which is run to storage tanks, and forced, by pneumatic power, to the tower of the super-sphate building. The plant has 2 Westinghouse engines, with Babcock & Wilcox boilers, and electric power is used throughout. Guano rock is secured om Ocean Island, in the Pacific, and the product of the works is super-sphates of high grade, for which there is a large demand in the Australian mmonwealth. The acid and fertilizer plants have proven highly successful.

Although the company's ore averages under 2½% in copper tenor, the ost-sheet makes an excellent showing, ore secured by quarrying costing pproximately one-third as much as that taken by underground extraction om the North Mount Lyell mine, the latter furnishing one-fourth to one-hird the total ore supply. The average cost of mining and treatment, for he fiscal year 1907, was only $3.58 per long ton, reflecting great credit upon he manager and staff.

To the end of 1907 the mine had produced about 160,000 tons of copper, nd large quantities of gold and silver. Production, for fiscal year 1904, was circa 406,000 long tons of ore, and remained practically unchanged until the latter half of 1907, when there was a considerable falling off, owing to depression in the metal industry. For the half-year ending March 31, 1908, production was circa 202,000 long tons of ore, yielding 4,247 long tons fine copper, 344,608 oz. silver and 10,489 oz. gold, and ore production for quarter ending June 30, 1908, was 106,241 long tons. For half year ending Sept. 30, 1907, the ore treated returned an average of 2.22% copper, 1.72 oz. silver and 0.045 oz. gold per ton. Production of fine copper has been as follows: 8,511,000 lbs. in 1904; 18,506,000 lbs. in 1905; 19,298,120 lbs. in 1906; 17,644,640 lbs. fine copper, 7,087 oz. silver and 19,849 oz. gold in 1907.

The Mount Lyell has been a hard property to handle, presenting of financial, mining and metallurgical problems, all of which have bee with great skill. The management is most excellent, in all departme the company obviously is endeavoring to extend its operations and pro which is the part of wisdom.

MOUNT LYELL NORTH CO. TAS

Dead. Formerly at North Mt. Lyell, Montagu Co., Tasmania.

MOUNT LYELL PEAKS MINING CO., N. L. TAS

Office: 90 Queen St., Melbourne, Australia. Mine office: North Lyell, Montagu Co., Tasmania. W. D. McWhae, manager. Capita £40,000, shares 10s. par. Lands, 80 acres, leasehold. Idle some ye apparently moribund.

MOUNT LYELL PROPRIETARY MINES, LTD. TAS

Dead. Voluntarily wound up, June, 1901. Formerly at Mt. Lyel tagu Co., Tasmania.

MOUNT LYELL SOUTH CO. TAS

Dead. Formerly at Mt. Lyell, Montagu Co., Tasmania.

MOUNT LYELL TASMAN COMSTOCK GOLD, SILVER, LEAD & COPPER MINING CO., LTD. TAS

Office: Launceston, Tasmania. Mine office: Mt. Lyell, Monta Tasmania. Bernard Bradley, manager. C. H. F. Shern, agent. Lan acres, leasehold. Idle and apparently moribund.

MOUNT LYELL WEST CO. TAS

Dead. Formerly at Mt. Lyell, Montagu Co., Tasmania.

MOUNT MERLIN COPPER CO., LTD. AUST

Office: Eagle St., Brisbane, Queensland, Australia. Thos. Welsby tary. Property is the Horse Creek mine, having a 114' shaft, showing tically vertical ore body.

MOUNT MOLLOY, LTD. AUST

Office: Irvinebank, Queensland, Australia. Mine office: Molloy well Co., Queensland, Australia. G. C. Young, secretary; J. Horsburg eral manager; R. Refle, superintendent Mount Molloy mine; T. Gurrin, intendent Mount Cardwell mine. Organized 1906, under laws of Que with capitalization £100,000, shares £1 par. Planned, circa June, 1908, ing capitalization by £50,000. Profits, for half year ending Dec. 3 were £41,257. Company paid dividends, to June 30, 1907, of 10s. share, amounting to £52,500.

Lands include a timber reservation, shortly north of the mine, quarry of ironstone, said to carry 1.5 to 2% copper, which is used for There also is a limestone quarry, near Nine-Mile Siding, about between Molloy and Bihoohra. The Mount Cardwell mine, at Nymboi well County, employed 13 men only at last accounts, and is but slightly oped. The Mount Molloy mine has 5 shafts, No. 5, the main shaft 475' deep. The 370' level does not show an ore body as big or as anticipated, though of fair size and grade. The 190' level proved disa ing also, showing a wide vein, low in copper contents, the 270' level be best in the mine. Ore occurs in rich chutes, mainly as chalcopyrite, m which is massive, said to assay as high as 50% in copper tenor, whi dently cannot be, as if ores do assay up to 50% copper, the so-called ch rite must be mainly chalcocite, associated with some chalcopyrite and On the 270' level the vein is 17' wide, carrying a 5' paystreak of high sulphides, balance of 12' consisting of low grade cupriferous pyrite. Th is estimated to show ore reserves of circa 20,000 long tons.

Equipment, at No. 5 shaft, includes a good engine-house, with first- *hoist*, boiler-house, air-compressor, etc. There is a 20,000-gallon under

, holding water for boilers and water-jackets of the 16-drill Thompson compressor. The company plans building a sawmill.

The smelter had a very troublesome water-jacket blast-furnace, which replaced by a larger furnace, blown in early 1907, and plans a second blast-furnace. Matte is taken from a storage forehearth to the converter department, which has one stand with 6x7′ shells, of barrel type, turning converter bars of 99% average copper tenor.

A 20-mile railway line, from Bihoohra to Mt. Molloy, was completed c. 1, 1908. This line, of 42″ gauge, laid with 45-lb. rails, is of great advantage to the company.

Production, 1906, was 10,359 tons of ore, of slightly better than 10% erage copper tenor, which yielded 2,441,846 lbs. fine copper and 9,118 oz. ver. Property is valuable, being one of the best copper mines in Queensnd, and management is considered good.

OUNT MORGAN COPPER CO. **AUSTRALIA.**

Dead. Reorganized as Moonmera Copper Mining Co., Ltd. Formerly at t. Morgan, Queensland, Australia.

OUNT MORGAN GOLD MINING CO., LTD. **AUSTRALIA.**

Office: 118 Pitt St., Sydney, Australia. English office: 9 Gracechurch t., London, E. C., Eng. Mine office: Rockhampton, Palmerston Co., Queensnd, Australia. Robt. Stubbs Archer, chairman; Walter Russell Hall, chairan Sydney board; Wm. Knox D'Arcy, chairman London board; preceding fficers, Hon. Albert James Callan, Kelso King, Richard Gardiner Casey and enneth De Lacy Cudmore, directors; George Anderson Richard, general manger; H. P. Seale, assistant manager; Holyoake Wood, secretary; John Jenkins, ondon secretary; J. B. Wilson, mine manager; N. F. White, engineer.

Organized Oct. 1, 1886, under laws of Queensland, with capitalization £1,000,000, shares £1 par; 17s. 6d. paid in. From organization to and including May 31, 1908, company paid dividends of £7,079,166, 13s. 4d. Dividends, 1907, were £237,500, and largest dividends were £1,100,000, in 1889. Declared, circa February, 1908, a 1s. dividend. Company is second only to the Broken Hill Proprietary as a dividend payer among Australian mines, and is one of the most profitable mines of any metal in existence.

Lands, circa 640 acres, freehold, also 80 acres leasehold and 90 acres perpetual leasehold, about 25 miles southwest of Rockhampton, also miscellaneous landed holdings, including the Many Peaks mine. The Mount Morgan has been, for two decades, one of the greatest gold producers of the world, but has shown declining values and decreasing gold output for several years, due mainly to increased depth, but partially to the mistaken policy formerly followed of extracting the richest ore without due regard for reserves.

The Mount Morgan gold mine apparently is merely the gossan of a mammoth copper deposit. This showing increased copper values at depth, the company wisely begun extensive diamond drill borings, which proved an immense tonnage of copper ore. While the Mount Morgan formerly was a gold mine, and now is a copper mine also, the two mines really are one, the copper ores coming mainly from the 750′ level, or below. The gold ore of the mine carries copper, and the copper ore carries gold, the classing of the ore being largely a matter of selection according to predominant mineral values. The mine, while a single mammoth property, is worked as two connected mines, the upper section being worked open-cast, yielding oxidized gold ore, while the underground workings yield cupriferous gold sulphides and auriferous copper sulphides. The overburden is removed by steam shovels, which are used also in ore extraction, to some extent, and about one-half of the gold ore treated is secured by *open-cast workings*. The oxidized ores are decreasing in *tonnage and values, oxidized ores*, for fiscal year ending May

31, 1908, yielding an average of only 3.4 dwts. gold per ton, a considerable decline from the high values formerly secured. The sulphide gold ore, known locally as mundic, being pyrite, yielded circa 11 dwts. gold per long ton.

The underground workings are developed by the 1,035′ Main shaft and the 650′ Lynda incline shaft, which is the largest in the Commonwealth of Australia. Extraction is mainly from the 750′ level, and the deepest level is at 850′. For fiscal year ending May 31, 1908, the mine made 4,752′ of underground openings, in addition to extensive open-cast operations. The mine shows reserves of low grade sulphide ores, from the 315′ to 750′ levels inclusive, estimated at 7,000,000 long tons, but it is not certain just what proportion of this tonnage is payable. Estimates of auriferous copper ores, 1906, were 1,212,000 long tons of ore averaging 3.5% copper and 8 dwts. gold per ton, and 1,597,000 tons of ore averaging 3% copper and 2.5 dwts. gold per ton, with considerably larger quantities carrying 2 to 3% copper and 1 to 2 dwts. gold per ton, all of which should be available for extraction later. For 1906 the copper ore treated averaged circa 2.5% copper and 7 dwts. gold per ton.

The Many Peaks mine, some miles distant from Mount Morgan, carries a considerable body of low grade pyritic ore, averaging circa 2.5% copper, which is excellently adapted to fluxing the Mount Morgan copper ores. A railroad connecting the Many Peaks mines with Mount Morgan is planned, and it is expected to use circa 100,000 tons of low grade ore yearly, from the Many Peaks, for fluxing, on the completion of this line.

Ironstone for fluxing is brought by vessel from Iron Island, circa 15 miles north of Keppel Bay, and limestone is secured from a quarry at Marmor, which has electric lights.

The district being arid, extensive dams have been built, these having a total capacity of 380,000,000 gallons. It is planned to transfer water by pipe line, thus obviating considerable present losses through seepage and evaporation.

The company has an extensive mill for reduction of gold ores, gold being secured from oxidized ores and from sulphide ores by chlorination, while gold also is secured from blister copper by electrolytic refining, and the gold mill furnishes circa 500 tons yearly of copper precipitate, of about 60% copper tenor.

The copper reduction plant, built at a cost of about £250,000, was completed, and the first furnace blown in, January, 1906, the third furnace going into commission early 1908. The smelter has 3 blast-furnaces, and a converter department with 2 stands. The product is blister copper averaging 98.6% copper and 14.5 oz. gold per ton, which is shipped to the De Lamar works, in New Jersey, U. S. A., for electrolytic refining, but the company will have in operation, 1909, its own electrolytic refinery, at Port Kembla.

Forces employed are circa 2,500 men, and ore is broken mainly on contract, this system proving very satisfactory to both employer and employe.

The Mount Morgan has yielded over £12,000,000 in gold, and crushes yearly circa 225,000 long tons of gold-bearing quartz, carrying an average of about 8 dwts gold per long ton. Production, for fiscal years ending May 31, has been as follows: 5,760,458 lbs. fine copper and 120,606 oz. fine gold in 1906; 12,456,640 lbs. fine copper and 153,092 oz. fine gold, valued at £911,72[illegible] in 1908. Copper ore treated for fiscal year 1908 gave an average extraction of 3.3% copper and 8.75 dwts. gold per long ton. In August, 1908, the works treated 16,780 long tons of ore, yielding 539 long tons blister copper and 6,730 oz. gold, and secured also, from the gold mill, 45 long tons of copper precipitate, carrying 34 long tons fine copper and 13 oz. gold, in addition to the gold production from the gold mill.

The Mount Morgan is one of the very best gold [illegible]
dition is a copper property of altogether exceptiona[illegible]

UNT MORGAN PROSPECTING CO., LTD.

Office and mine: East St., Rockhampton, Palmer[illegible]
stralia. Organized Nov. 28, 1907, under laws of Q[illegible]
zation £5,000, shares 1s. par. Company contracted [illegible]
of borehole, by diamond drill, with a view to locating [illegible]
ore body of the Mount Morgan Gold Mining Co., Ltd.

UNT ORANGE MINING CO.

Mine and works office: Mt. Flora, Queensland, Austral[illegible]
h[illegible] small reverberatory furnace, which it was planne[illegible]
se[illegible]r 5 years. In June, 1908, smelter was reported to h[illegible]
ore [illegible]y, [illegible]g 60% matte.

UNT PERRY COPPER CO., LTD.

D[illegible] Property at Mount Perry, Burnett Co., Queensland[illegible]

UNT PERRY COPPER & REID'S CREEK GOLD MINES & SMELTING CO. LTD.

[illegible]

UNT READ MINING CO., LTD.

[illegible]

on the shores of Spirit Lake, in the St. Helen's district, circa 50 miles from Portland. Lands include former holdings of the Sweden Copper Co., Calumet Copper Mining Co., Bronze Monarch Mining Co., Chicago Mining Co., Yellow Metal Mining Co., Earl Mining Co. and Cascade Copper Mining Co. The company also owns a three-fourths in the United mines, the holdings being practically a parallelogram of 1½ miles width by 4 miles in length. In addition to copper ores the tract contains sundry gold veins, an ochre bed, granite quarry, and a deposit of pumice stone.

The property shows syenite, diorite and slate, carrying fissure veins and contact deposits between diorite and syenite, with about 20 ore bodies more or less developed, these ranging from 5′ to 100′ in width, carrying mainly sulphide ores, including chalcocite, bornite and chalcopyrite, giving assays of 2 to 25% copper, 2 to 50 oz. silver and $1 to $40 gold per ton, with occasional lead values, the usual oxidized ores being absent.

Development is almost exclusively by tunnels, there being a 50′ shaft and tunnels of 250′, 400′, 600′ and 2,300′, with total workings of circa 5,500′, estimated to show 125,000 tons of ore of medium and high grades, with a greater tonnage of milling ore.

The Sweden-Norway-Denmark group carries a vein of 30′ to 40′ width, between diorite and syenite, mineralization being mainly on the footwall, with frequent chutes of rich ore, running from 3 to 20% copper, 4 oz. silver and $1.50 to $7 gold per ton.

The Earl group shows a strong gossan carrying small gold values, with occasional bunches of high grade copper ore, the gossan apparently overlying a breccia.

The Bronze Monarch group, adjoining the Sweden, opened by a 300′ tunnel, has produced circa 1,000 tons of auriferous and argentiferous copper sulphides.

The Polar Star mine is said to show a 2′ to 5′ vein of ore giving assays of 10 to 30% copper, 8 to 70 oz. silver and $3 to $11 gold per ton.

The Minnie Lee group, 4 miles from the Polar Star, has about 500′ of workings, showing low grade auriferous and argentiferous copper ore.

The Index mine, circa 2½ miles from the main group, shows a vein of 44′ estimated average width, carrying ore said to average 1.5% copper, 8 oz. silver and $4 gold per ton.

Equipment includes an 80-h. p. Pelton water-wheel and a 6-drill Sullivan air-compressor. There is a sawmill, with about 25 shops and cabins at the various camps.

The property has been practically idle for several years, but a small amount of development work is planned for 1909. Lands are owned outright, and the company has no bonds or debts, with a small amount of cash on hand. Property considered promising and management good.

MOUNT SHASTA GOLD MINES CORPORATION. **CALIFORNIA.**

Dead. Was partly "succeeded," 1904, by Phœnix Gold Mining Co. Was an unsavory bit of stock jobbery. Formerly at Shasta, Shasta Co., Cal. Fully described Vol. IV.

MOUNT SICKER & BRITISH COLUMBIA DEVELOPMENT CO., LTD. **BRITISH COLUMBIA.**

Office: 116 St. Vincent St., Glasgow, Scotland. Mine office: Mount Sicker, Vancouver Island, B. C. Kenneth H. M. Connal, chairman; John D. Steel, secretary. Organized Oct. 20, 1898, under laws of Great Britain, with capitalization £125,000, shares £1 par. Lands, sundry claims on Mount Sicker, Vancouver Island and in the East Kootenai district of British Columbia. *Idle for some years.*

OUNTS SICKER & BRENTON MINES, LTD. **BRITISH COLUMBIA.**

Office: 764 Bullitt Bldg., Philadelphia, Pa. Mine office: Mount Sicker, ancouver Island, B. C. Dr. T. J. Jones, president; John Edmonds, vice esident; Jas. A. Cameron, secretary, treasurer and managing director; Jas. mes, superintendent. Capitalization, $1,000,000.

Lands, 9 claims, area 352 acres, 49 miles north of Victoria, in 2 groups, own as the Copper Cañon group of 5 claims, on Mount Sicker, and a oup of 4 claims on Mount Brenton. Property is in the same geological rizon as the Tyee and Lenora mines, and carries a continuation of the histose ore formation of those mines. Development is by a two-compartent shaft, sunk at an angle of 76°, variously reported as 80′ to 144′ deep, owing a little good ore in the bottom, values apparently improving with pth. Considerable development work, done at different times, on various aims, has given encouragement, but the company has not yet secured a rkable ore body. Equipment is said to include necessary mine buildings.

OUNT STANLEY MINING CO. **ARIZONA.**

Mine office: San Carlos, Gila Co., Ariz. Martin Davis, superintendent, last accounts. Organized, 1905, with capitalization $1,000,000, shares $1 ar.

OUNT TRITLE COPPER CO. **ARIZONA.**

Mine office: Prescott, Yavapai Co., Ariz. H. R. Ward, consulting engier. Organized under laws of Arizona, with capitalization $500,000, shares 1 par. Lands, 11 claims, on the southern slope of Mount Tritle, near the ead of Slate Creek, circa 12 miles south of Prescott. Mine, formerly known the Dunkirk, is an old property, once worked as a gold mine, having 4 annels, of 150′, 160′, 170′ and 270′ length, driven at vertical intervals of 0′, showing argentiferous and auriferous copper and lead ores, apparently arrying values in copper, gold, silver and lead, in order named. Has steam ower, air-compressor and electric light plant. Has a 30-ton mill with 4 issen stamps, 3 Wilfley tables, 100-ton ore bin and 10,000-gallon water ank. Begun production early 1907, and middle of year was producing about 00 tons of ore monthly. Property considered promising, but creditors applied or a receiver, October, 1908.

OUNT TURNBULL COPPER MINING & SMELTING CO. **ARIZONA.**

Mine office: Safford, Graham Co., Ariz. P. W. Keller, president; Larkin . Rockwell, secretary. Idle since circa 1899, and presumably moribund.

OUNT UNION CONSOLIDATED MINING CO. **ARIZONA.**

Office Germania Bldg., St. Paul, Minn. Mine office: Prescott, Yavapai o., Ariz. R. H. Green, president; W. H. Fagley, vice president; H. M. emple, secretary; J. E. Whalen, general manager; Edward M. L'Engle, uperintendent. Organized 1904, under laws of Arizona, with capitalization 3,600,000, shares $1 par, as successor of the Mount Union Mining Co. and Arizona-Michigan Mining Co. Lands, 19 claims, in Cook Cañon, on the outhwestern slope of the Mount Union, in the Senator Range of the Bradshaw Mountains, Hassayampa district, circa 14 miles south of Prescott. The roperty has about 2,000′ of workings. The Arizona-Michigan mine, 9 claims, has a 175′ shaft, with circa 1,000′ of workings, showing a vein of 3′ to 6′ width, carrying a 12″ paystreak of argentiferous and auriferous copper ore and galena. The property also is reported to have a 460′ shaft. Equipment includes a 75-ton mill. Idle.

OUNT UNION MINING CO. **ARIZONA.**

Dead. Merged, 1904, in Mount Union Consolidated Mining Co. Formerly Prescott, Yavapai Co., Ariz.

OUNT WARATAH COPPER MINES, LTD. **TASMANIA.**

Office: 6 Moorgate St., *London, E. C., Eng.* Operating office: Zeehan,

Tasmania. Mine office: Heazlewood, Tasmania. J. H. Wolf, chairman; J. E. Meadowcroft, secretary; preceding officers and S. F. Ralli, directors; Capt. John Walters, general manager. Organized Feb. 18, 1907, under laws of Great Britain, with capitalization £125,000, shares £1 par; issued, £100,000.

Lands, 202 acres, in 3 leases from the Tasmanian government, showing 5 ore bodies, carrying chalcopyrite, associated with pyrite in a quartz gangue, averaging circa 5% in copper tenor, also a body of galena. Development is by shafts of 60′ and 170′, with tunnels aggregating 1,000′ length. Company plans continuous development.

MOUNT WARMINSTER MINE. AUSTRALIA.

Office: 166 Bolsover St., Rockhampton, Queensland, Australia. Mine office: Mt. Chalmers, Palmerston Co., Queensland, Australia. Wm. Thompson, secretary; J. Bruce, mine manager. Lands, 100 acres, 80 acres freehold, 2 miles from Fitzroy and 10 miles northeast of Rockhampton. Mine has 2 shallow shafts and a short tunnel, latter showing a 12′ vein of oxidized and sulphide ores of 2% copper tenor. Shipped, 1907, a parcel of 23 tons of 20% copper ore to Waratah smelter. Employs 10 men.

MOUNT WASHINGTON COPPER CO. MARYLAND.

Dead. Property sold under foreclosure, March, 1903. Formerly at Mount Washington, Baltimore Co., Md.

MOUNT WHIPPLE MINING CO. CALIFORNIA.

Mine office: Needles, San Bernardino Co., Cal. Lands are near Empire Flats, on the Colorado river, near the junction of the Bill Williams Fork river. Presumably idle.

MOUNT ZIRKEL COPPER MINING CO. COLORADO.

Office: 240 La Salle St., Chicago, Ills. Mine office: Pearl, Larimer Co., Colo. Wm. A. McGuire, president; E. B. Boisot, secretary and treasurer. Organized 1901, under laws of Washington, with capitalization $1,000,000, shares $1 par. Is controlled by Standard Development Co. Lands, 7 claims, area 60 acres, also a 5-acre millsite, in the Big Horn district, showing a 7′ fissure vein, claimed by company to average 20% copper, 4 oz. silver and $1 gold per ton, which is untrue, opened by a 250′ shaft. Idle some years. Is not regarded favorably.

MOURGOUL RIVER COPPER CO., LTD. RUSSIA.

Dead. Formerly at Dzansulski, Kutais, Russia.

SOCIÉTÉ ANONYME DE MOUZAÏA. ALGERIA.

Office: 5 Rue St. Vincent-de-Paul, Paris, Xe., France. Mine office: Camp des Chenes, par Blida, Alger, Algeria. E. Raschlé, president; R. Lavy, secretary; M. Duvialard, general manager. Organized 1891, with capitalization 350,000 francs.

Lands, 5,362 hectares, showing 6 fissure veins, in schists, carrying chalcopyrite, and 10 contact veins carrying antimonial gray copper, veins ranging from 2cm. to 1m. wide and averaging 4 to 5% copper, and from nothing to 27 oz. silver per ton. Mine is opened by a 17m. shaft and 7 tunnels of 39m. to 63m. length, in chalcopyrite, and by 12 tunnels, four longest 220m., 240m., 255m. and 265m., in gray copper ore. Property is served by the West Algerian railroad, 2km. distant. Copper properties have been idle since 1899, but the company has developed large bodies of hematite and spathic iron, estimated to contain 1,200,000 metric tons of ore of merchantable grade.

MOZUMI MINE. JAPAN.

Owned by Mitsu Bishi Goshi Kwaisha.

M'TAMBA COPPER DEVELOPMENT CO., LTD. TRANSVAAL.

Office: Johannesburg, Transvaal. J. H. Rainier, P. J. Dennyssen, F. T. Blane and Geo. Peel, directors. Organized circa February, 1908, under laws of Transvaal, with capitalization £16,000, shares £1 par. Vendors took £9,000

shares. Lands, 1,284 claims, in a tract circa one mile wide and three miles ng, 107 miles from Pietersburg.

ULATOS MINING CO. **MEXICO.**

Dead. Formerly at Mulatos, Sahuaripa, Sonora, Mex.

ULLAN MINING CO. **IDAHO.**

Mine office: Mullan, Shoshone Co., Ida. Lands are on the east fork of eadman Creek. Resumed operations, October, 1908, after about 3 years lleness.

ULOCK MINE. **MICHIGAN.**

Office: care of R. P. Mulock, owner, Colfax, Ia. Mine office: Matchwood, Ontonagon Co., Mich. John F. Dreiss, superintendent. Lands, 160 cres, being the Northwest ¼ of Section 9, Town 49 North, Range 41 West, ear the Norwich. Exploratory work, 1903-1905, has shown 2 amygdaloidal eds, outcropping at a distance of about 400' apart, with average widths of irca 6' and 15', opened by several pits, showing copper.

ULTNOMAH MINING & MILLING CO. **WASHINGTON.**

Office: 1214 Harmon Ave., Minneapolis, Minn. Mine office: Bangham, Okanogan Co., Wash. J. N. Hudnut, president; M. J. Hills, vice president; David W. Peabody, secretary; Geo. S. Wickman, treasurer; Dr. F. O. Hudnut, general manager; Thos. B. Early, superintendent. Organized under laws of Washington, with capitalization $2,000,000, shares $1 par.

Lands, 8 claims, opened by a 930' tunnel, planned to be driven 1,500', said to cut a 15' vein, carrying mainly auriferous and argentiferous lead ore.

MUNGANA (CHILLAGOE) MINING CO., LTD. **AUSTRALIA.**

Office: 39 Queen St., Melbourne, Australia. English office: Palmerston House, Old Broad St., London, E. C., Eng. Mine office: Mungana, Lynd Co., Queensland, Australia. Employs 350 men. Harvey Patterson, chairman; W. J. Saddler, vice-chairman; C. L. Hewitt, secretary; Edwin Habben, London secretary; Stanley N. Rodda, manager. Organized March 1, 1901, under laws of Queensland, with capitalization £125,000, shares 5s. par, fully issued. Statement of finances, as of date June 30, 1908, gave assets of £185,072 7s. 3d., and liabilities of £134,088 13s. 8d., with £6,123 12s. 10d. on hand. For fiscal year ending June 30, 1908, net profit was £8,090 17s. 2d. Annual meeting, second Monday in October.

Lands, 5 claims, area 287 acres, in the Walsh and Tinaroo districts, about 10 miles west of Chillagoe, including a number of mines, of which the principal properties are the Girofla and Lady Jane. The property shows considerable ore, assaying up to 8% in copper tenor, but is primarily a silver-lead mine, with greatest values in silver, followed in turn by lead and copper. The mine is very wet, and considerable trouble has been had in sinking at times, inflow of water being beyond the pumping capacity. Timbering is by square sets.

The Girofla mine gives a good surface showing, and carries a large ore body containing workable values in silver, lead and copper. Equipment is three shafts, No. 3 being 510' deep. There also is a large open cut to depth of 60'.

The Lady Jane mine lost its old shaft from a crush, and now has a water flow of circa 200,000 gallons daily. The old shaft, through drawing, has been replaced by the 630' Saddler shaft, with 4 compartments and is 4' 6"x15' 9" in size, inside timbering. It is 100' west of old Lady Jane No. 3 shaft.

There also are minor properties, including the Chillagoe Consolidated open-cut; Calumet, having an 80' shaft; Magazine, having an open pit, and the Dorothy, having a 200' shaft.

The mine has a number of sheds and buildings, [illegible]

workshop, built 1908. Waterworks include a service furnished to t with fire protection for all mine buildings, with tanks holding 4 supply at each mine. The property is served by the Chillagoe to Railway. Fuel is wood.

Production for fiscal year ending June 30, 1906, was 969,280 copper, 652 long tons lead and 128,600 oz. silver, and for fiscal year June 30, 1907, was 30,275 tons of ore, yielding 2,719,360 lbs. fine copp long tons lead and 298,505 oz. silver.

SUCESIÓN JUAN MUÑOZ.

Office and mine: Higuera, La Serena, Coquimbo, Chile. José general manager. The mines are Las Casas and Ají, opened to depth meters, with horizontal workings 1,350 meters in length, developmen partly by tunnel. Country rock is syenite. Equipment includes a & Halske electric plant. Near the mine is the smelting establishment, as San Juan, having a modern equipment, including an electric ligh intercommunicating telephone system, etc. Ores under 5% in coppe are not treated. Smelter has 3 reverberatory furnaces. Productio was 3,770 tons of ore averaging 9.5% in copper tenor, from which w duced 775,680 kilos of ejes, averaging 46.31% copper tenor, giving an equal to 791,958 lbs. fine copper. The mines offer good working co and the property is managed with vigor and success.

MUNROE-THOMPSON ORE REDUCTION CO. NOVA S

Dead. Was a bad egg. Formerly at Wentworth Centre, Cumberl N. S. Fully described Vol. IV.

MURCHISON COPPER MINING SYNDICATE. AUST

Mine office: Barraba, N. S. W., Australia. Lands, 30 acres, le 2 miles north of Gulf Creek, slightly prospected.

MURRAY COPPER MINING CO.

Mine office: Brighton, Salt Lake Co., Utah. Henry Harker, pr Matt. Gilby, vice-president; A. R. Condict, secretary. Organized 190 laws of Utah, with capitalization $50,000, shares 10 cents par.

MURRIN COPPER MINES, LTD. AUST

Dead. Voluntarily wound up, March, 1905. Formerly at Murri Australia.

MURTEGA MINERALS CO., LTD. POR

Office: 8 Princes St., London, E. C., Eng. Letter returned unclaimed f mer mine office, Barrancos, Alemtejo, Portugal. J. Dunham Massey, ch H. G. Jones, secretary. Organized Dec. 8, 1900, under laws of Great with capitalization £80,000, shares £1 par; issued, £67,567. Lands i old copper mines. Company endeavored to open a mine at the pre point of intersection of 3 main veins, in the center of a hill, under a ing gossan capping, by shaft and tunnel. Idle several years and ap moribund.

MUTOOROO COPPER & SILVER MINING CO., LTD. AUST

Office: care of J. P. Winch, Hindley St., Adelaide, South A Mine office: Cockburn, South Australia. Lands, 320 acres, leasel miles southwest of Cockburn, carrying lenticular ore bodies of cons size, in contact deposits near intrusive rocks, ores including cuprit chite, azurite, chrysocolla and atacamite in the oxidized zone, chan depth to chalcocite, bornite and chalcopyrite, associated with pyrite. reported production, first half 1905, was 100 long tons of 16% cop Property has paid several small dividends. Idle.

COMPAÑIA MINERA y FUNDIDORA DE LA MUTUA. M

Mine office: Zimapán, Hidalgo, Mex. León Lemaire, general m

NACOZARI CONSOLIDATED COPPER CO. MEXIC

Office: care of W. L. Musick, president, Burlington Bldg., St. Louis, M Mine office: Pilares de Teras, Moc ezuma, Sonora, Mex. John G. Alexand superintendent. Organized under laws of Arizona, apparently succeeding t Nacozari Copper Co., and protocolized under laws of Mexico. Lands, 40 pe tenencias, area 98 acres, including La Galera, La Puerta and Copper Que mines, one said to be an antigua, near the Moctezuma Copper Co., and carr ing a 10′ to 20′ vein, supposed to be the extension of the Pilares ore body the Moctezuma.

NACOZARI COPPER CO. MEXIC

Dead. Organized September, 1906, and apparently succeeded, 1907, b Nacozari Consolidated Copper Co. Formerly at Pilares de Teras, Moctezum Sonora, Mex.

NADAR COPPER MINES, LTD.

Office: Bassishaw House, London, E. C., Eng. Robt. Biggar, secretar Organized Apr. 5, 1907, under laws of Great Britain, with capitalizati £100,000, shares £1 par. Apparently inoperative.

NAFVERBERGS KOPPARVERK. SWEDE

Owned by Naversberg Falun Copper Mines & Works, Ltd.

NAGAMATSU MINE. JAPA

Owned by Furukawa Mining Co.

NAHMINT MINING CO., LTD. BRITISH COLUMBI

Mine office: Alberni, Vancouver Island, B. C. A. C. Cabel, superi tendent. Organized 1898, with capitalization $100,000. Property is the Hay mine, on the western side of the Alberni Canal, having 3 tunnels, longe 1,200′, with about 1 mile of workings. Has a 1-mile aerial tram, leadi to a shipping wharf at tidewater. Ore shipped, 1898-1899, to Tacoma smelt gave average returns of 13% copper, 1 oz. silver and 65 cents gold per to Suspended operations, 1902, when mine was said to be nearly exhausted, a idle since circa 1904.

F. B. NAJARA y CA. MEXIC

Office and mine: Topia, Tamazula, Durango, Mex. Properly has aurife ous and argentiferous copper ores. Employed circa 40 men at last account

COMPAÑIA MINERA DE NALTAGUA. CHIL

Dead. Was succeeded, Jan. 26, 1907, by Société des Mines de Cuivre Naltagua (Chili). Formerly at Naltagua, Milipilla, Santiago, Chile.

SOCIÉTÉ DES MINES DE CUIVRE DE NALTAGUA (CHILI). CHIL

Office: 52 Blvd. Haussmann, Paris, France. Mine office: Naltag Milipilla, Santiago, Chile. J. de Bethan, A. Boscher, Chas. Chalput, H. Lamarre, A. de Bitrick, P. Keller, E. Leolino, M. Lyon and A. de Mun, dir tors. Organized Jan. 26, 1907, under laws of France with capitalizati 10,000,000 francs, shares 100 francs par. Mine, opened 1898, was owned p viously by Compañía Minera de Naltagua.

NAMAQUA VENTURE SYNDICATE. CAPE COLON

Mine office: Wittwater, Little Namaqualand, Cape Colony. Did so development work, circa 1904. Presumably idle.

NANAIMO JUBILEE MINING & DEVELOPMENT CO., LTD. BRITISH COLUMBI

Mine office: Dunsmuir, Vancouver Island, B. C. Lands, known as t Delphi group, on the south fork of the Nanaimo River, circa 18 miles from t Esquimault & Nanaimo railway, show a vein of 10′ to 15′ width, carrying f copper values. Property considered promising.

NANCOT COPPER CO. NEW MEXIC

Office: care of H. S. Clark, president, Southboro, Mass. Mine offic

len, Valencia Co., N. M. Organized October, 1902, under laws of New Mex-, with capitalization $1,000,000, shares $1 par. Bonds, $250,000 authorized, nning 5 years, at 6%, company giving a $2 stock bonus with each dollar of nds sold. Lands, 26 claims, in the Manzana Mountains, near Belen, fairly mbered and watered. Mine has a 2-compartment shaft, and shipped a few rloads of ore running 15 to 20% copper. Presumably idle.

ANTLLE VALE COPPER MINING CO., LTD. **WALES.**

Office: 11 Dale St., Liverpool, Eng. Mile office: Llanllyfin, Carnarvon, ales. O. A. Harling, chairman; W. H. Hill, secretary. Organized Sept. 9, 00, with capitalization £5,000, shares £1 par. Issued, £4,007. Debentures, ,500, "protected" by first, second and fourth mortgages. Idle and appar-tly moribund.

APA COUNTY COPPER MINING CO. **CALIFORNIA.**

Dead. Formerly at Middletown, Lake Co., Cal., but with lands in Napa unty, California. Deseribed Vol. VI.

APOLEON & MAGHERA COPPER MINING & REDUCTION CO. UTAH.

Office: Lock Box 537, Cedar Rapids, Ia. Operating office: Ogden, Utah. ine office: Utah Hot Springs, Box Elder Co., Utah. Employs 10 to 40 men. on McGuire, president and general manager; John H. Kincaid, vice-presi-ent; Dr. Frank Carroll, secretary and treasurer; John E. Dalbey, superin-endent; preceding officers, Lee Kincaid, Wm. Zaff and Dr. C. T. Chandler, irectors. Organized Feb. 23, 1904, under laws of Utah, with capitalization 1,000,000, shares $1 par. Annual meeting, second Tuesday in June.

Lands, 12 claims, area 240 acres, also a 10-acre millsite, in the Sierra adre district, showing gneiss carrying 4 fissure veins, of which 2, under evelopment, are practically parallel, estimated by company at 20' average idth and traceable 5,000'. Veins show malachite, bornite and chalcopyrite, ith occasional chalcocite and copper silicates, estimated to average 2% cop-er, 4 oz. silver and $2 gold per ton. Development is by a 120' shaft and by unnels of 1,800', 1,100', 300' and 50', with about 4,000' of workings, esti-ated to show 400,000 tons of ore, with 75,000 tons blocked out for stoping. here is a 2,682' Broderick & Bascom aërial tram.

Equipment includes a 20-h. p. steam plant. There is a 30x36' machine hop and a 30x36' carpenter shop, both of frame construction, covered by heet steel. Company plans a concentrator.

APOLEON MINE. **CALIFORNIA.**

Mine office: Copperopolis, Calaveras Co., Cal. Is the oldest copper mine n California, and once was a considerable producer. Vein channel is 100' ide and ranges from diabase to talcose schist, ore bodies occurring in lenses p to 20' wide. Ores are principally sulphide, with a fair sprinkling of car-onates and oxides. Old shaft, 325'. A new shaft has been sunk to the west ard. Some copper has been produced, during past few years, by leaching he old dumps.

APOLEON MINE. **WASHINGTO**

Mine office: Boyds, Ferry Co., Wash. Is owned by British Columbia Copper Co. Ore is low in grade, carrying small values in copper, silver and gold, with about 20% silica and 40% iron, being valuable mainly for flux. Has 3-drill and 7-drill air-compressors, and a 4,100' tram. Is said to plan an cyanide plant to treat low grade auriferous ores. Was shipping when 100 tons of ore daily.

ARLARLA SILVER-LEAD MINING CO., LTD.

Mine office: Mount Marmion, Western Australia. Y. H. anager. Lands, 240 acres, 30 miles from Mount Marmion and Perth, on the Barker River, in the Napier Range, carrying [illegible] ', assaying 24 to 164% copper, 47 to 68% lead and [illegible]

mated by company to average 8% copper, 50% lead and 10 oz. silver, w in all likelihood, is an overestimate. Also has property at Moondoom miles from Narlarla, said to show a 20′ vein traceable 3,000′, showing crops of ore that can be hand-sorted to 30% copper tenor.

NASSAU COPPER CO. CALIFOR

Mine office: Milton, Calaveras Co., Cal. A. S. Pool, superinten Property, known as the Goat Ranch mine, was developing with about 20 at last accounts.

NAST MINING & MILLING CO. U

Dead. Was absorbed by New England Gold & Copper Mining Co. merly at Bingham Canyon, Salt Lake Co., Utah.

NATICK COPPER CO. MICHI

Office: Leopold Bldg., Houghton, Mich. Mine office: Copper Falls, weenaw Co., Mich. F. W. Nichols, resident manager. Lands, 200 acres tween the Humboldt and Eagle River properties, being the West ½ of S 17, Town 58 North, Range 31 West. Idle for many years.

NATIONAL CAPITAL COPPER CO. MEX

Office: Dallas, Texas. Mine office: Coapa, Morelia, Michoacán, Neale Starke, president; W. F. Thatcher, secretary. Organized Apr. 23, under laws of Virginia, with capitalization $150,000, shares $1 par. L 550 pertenencias, area circa 1,375 acres, in the Tacambaro district, show contact deposits between granite and limestone, carrying native copper argentiferous and auriferous oxide, carbonate and sulphide ores. Two are being developed by tunnels, the Confianza vein being said to be 70′ Nearest railway is the Mexican National, 45 miles distant. Property is watered and timbered.

NATIONAL CONSOLIDATED MINING CO. ARIZ

Office: 420 Milwaukee Ave., Chicago, Ills. Operating office: No Ariz. Mine office: Patagonia, Santa Cruz Co., Ariz. Employs 8 men. E. Porter, president; S. F. Johnson, vice-president; A. F. Richardson, tary; Alfred Thurtell, treasurer and general manager; preceding officers E. E. Bethel, directors; Geo. D. Gross, superintendent. Organized D 1905, under laws of Arizona, with capitalization $1,000,000, shares $1 issued, circa $700,000. Annual meeting, first Monday after first Tuesd January.

Lands, 21 claims, area circa 400 acres, also 40 acres in millsites, pr including the Silver Glance group, about 12 miles northwest of No Lands show granite and diorite, former frequently decomposed, and occa limestone, carrying a number of fissure veins and contact deposits, of 6 are partly developed, principal vein of circa 12′ average width ca chalcocite and galena, estimated to average 3% copper, 10% lead, 12 oz. and $9.75 gold per ton. Development is by shafts of 60′, 110′, 80′ an and by tunnels of 193′ and 120′.

Equipment includes a 12-h. p. Fairbanks & Morse gasoline hoist and are 5 mine buildings. Company plans continuous and systematic develop

NATIONAL COPPER CO. CALIFO

Mine office: Needles, San Bernardino Co., Cal. Lands, in the W Mountain district, in the eastern part of San Bernardino county, have s prospecting shafts, with small mine buildings, and company was said, A 1908, to plan beginning small ore shipments.

NATIONAL COPPER CO. NEW JE

Office: 250 Water St., New York, N. Y. Works office: Elizabeth, Co., N. J. H. Heppenheimer, president and general manager. Orga circa August, 1906, under laws of New Jersey. Property is a small sm *plant, treating* custom ores and matte. Became bankrupt Jan. 10, 1908.

ONAL COPPER CO. **NEW MEXICO.**

fice: care of Col. Ed. Butler, president, St. Louis, Mo. Mine office: City, Grant Co., N. M. C. P. Laughlin, superintendent. Capitalization, 000. Lands, circa 12 claims, 4 miles from Chemung Copper Co., in water Cañon, Burro Mountains, opened by a tunnel and 200′ main shaft, g a fissure vein in granite, of 60′ estimated average width, carrying chalcocite, with considerable ore developed. Has steam power and a lk air-compressor, and is said to plan a concentrator.

ONAL COPPER CO. **WASHINGTON.**

ine office: Springdale, Stevens Co., Wash.

ONAL COPPER & GOLD MINING CO. **ARIZONA.**

fice: care of Gates M. Fowler, general manager, Phœnix, Ariz. Mine Wellton, Yuma Co., Ariz. Organized 1904, under laws of Arizona. are the Rogers Springs group, held on $60,000 bond and lease from Marlar. Presumably idle.

ONAL COPPER MINES CO. **IDAHO.**

fice: 605 Couch Bldg., Portland, Ore. Mine office: Cuprum, Washing-, Idaho. J. J. Richardson, president; Wm. Trevor, vice-president and tendent; R. A. Proudfoot, treasurer; L. B. Reeder, secretary; preced-ficers, J. F. Boone, F. B. Jones, W. E. Jones, H. A. Mautz and J. W. , directors. Organized May, 1905, under laws of Oregon, with capitali-$1,000,000, shares $1 par. Lands, 17 claims, area 330 acres, on Horse in, in the Seven Devils district, opened by a shallow shaft and several , longest circa 750′, with about 1,000′ of workings, showing argentif-nd auriferous chalcocite.

ONAL COPPER MINING CO. **IDAHO.**

fice: 115 Howard St., Spokane, Wash. Operating office: Wallace, Mine office: Mullan, Shoshone Co., Idaho. D. E. Keys, president; r McCrea, secretary; Chas. McKinnis, manager; F. Cushing Moore, con-engineer. Organized Sept. 22, 1906, under laws of Washington, with ization $1,250,000, shares $1 par.

nds, 6 claims, west of the Lucky Calumet, between the east and west f Deadman Creek, circa 4 miles northeast of Mullan, near the Imperial pper King properties, and west of the Lucky Calumet. Suit has been t by C. H. Williams and A. H. Featherstone over title to lands.

velopment is by a tunnel and a 2-compartment main shaft, showing a 7′ to 10′ width, with a 30″ paystreak giving average assays of about copper, 25% lead and 10 oz. silver per ton, copper being mainly from ite and occasional chalcopyrite, while lead values are mainly from car-ores and occasional galena. Both the lead and copper ores are con-ly argentiferous.

uipment includes a 15-drill electric air-compressor, energy being taken he Washington Water Power Co.

NAL COPPER MINING CO. **UTAH**

ice: 400 D. F. Walker Bldg., Salt Lake City, Utah. Letter return-ed from former mine office, Castleton, Grand Co., Utah. F. Rankin, t; W. H. Tibbals, vice-president; C. E. Peyton, secretary and [illegible] Capitalization $100,000, shares 10 cents par. Lands, circa 110 [illegible] Sal Mountains, Sonoma district, showing ore assaying up to [illegible] and 17.5 oz. silver per ton, taken from a 6-foot vein [illegible] Long idle and apparently moribund.

NAL COPPER MINING CO.

ce and mine: Douglas, Converse Co., Wyo. Frank [illegible] W. Johnson, secretary; R. C. Paul, general [illegible] 06, with capitalization $250,000. Long idle and [illegible]

NATIONAL COPPER ORE CO. **VIRGINIA.**

Mine office: Garrisonville, Stafford Co., Va. Has cupriferous pyrite. Idle and apparently moribund.

NATIONAL COPPER TEMPERING CO. **COLORADO.**

Office: 808 Continental Bldg., Denver, Colo. David Lamon, president; Henry Stewart, vice-president; Theo. H. Thomas, secretary and treasurer. Organized under laws of Colorado, with capitalization $500,000, shares $1 par. Claims to have a process for tempering copper that increases tensile strength by more than 500%, which is untrue. Careful tests of copper, claimed to have been tempered by this process, show no improvement whatever in the metal, and Mr. Lamon excuses himself therefor by the puerile statement that successful tests can be made only on a considerable quantity of material. Process considered worthless. Promised dividends impossible of realization, and company considered a mere bit of stock-jobbery.

NATIONAL DEVELOPMENT & MINING CO. **ARIZONA.**

Dead. Was succeeded, June 5, 1906, by Sultana-Arizona Copper Mining Co. Formerly at Kolvin, Pinal Co., Ariz.

NATIONAL GOLD & COPPER CO.

Office: care of Lewis Lusk, Spokane, Wash. Organized 1906, under laws of Washington, with capitalization $1,500,000, shares $1 par, to operate in "the United States, Canada and Mexico." Location of lands, if any, unknown.

NATIONAL GOLD & COPPER CO. **ARIZONA.**

Office: care of Ben Blanchard, manager, Prescott, Ariz. Mine office: Bouse, Yuma Co., Ariz. Lands are slightly developed by several shallow shafts. Idle.

NAMAQUA COPPER CO., LTD. **CAPE COLONY.**

Office: 3 Fenchurch St., London, E. C., Eng. Mine office: Concordia, Little Namaqualand, Cape Colony. Frederick J. Mirrielees, manager; Francis Phillips, superintendent; A. W. Outram, secretary. Organized Apr. 23, 1888, under laws of Great Britain, as a reconstruction of Namaqua United Copper Co., Ltd., with capitalization £200,000, shares £1 par; issued, £188,662. Operating profits were £57,819 in 1905, and nearly £100,000 in 1906. Has paid annual dividends of 5 to 40% since organization, except 1891-1894, and 1901-1902. Dividends were 5% in 1903; 7.5% in 1904; 7.5% in 1905; 10% in 1906 and 35% in 1907. A 2s. dividend was announced May, 1908. The company has a surplus fund of more than £40,000, invested in British consols, and has returned in dividends more than its capitalization.

Lands, 680 acres, leasehold, held on royalty of 2s. 6d. per long ton of ore produced. Mines are the Tweetfontein, with 7 shafts; Wheal Julia, with 3 shafts; Flat, with 1 shaft; New East Centre, with 1 shaft; Jubilee, with 2 shafts; Henderson, with 2 shafts, and Prospect, with 2 shafts. Ore is high-grade chalcopyrite, occurring in intrusive greenstone traversing granite, and the property has considerable ore reserves.

There are concentrating plants at the Flat and New East Centre mines, where crude ore is dressed up to circa 25% copper tenor and shipped for smelting to Swansea, via Port Nolloth.

Production was 5,276,712 lbs. fine copper in 1905, and 5,931,521 lbs. in 1906. The property is managed conservatively, and with marked financial success.

NATIONAL GOLD & SILVER MINING CO. **NEW MEXICO.**

Mine office: Steins, Grant Co., N. M. M. H. Sherman, president; B. L. Berkey, superintendent, at last accounts. Has steam power and a 50-ton concentrator. Shipped a little ore and concentrates, 1906. Presumably idle.

NATIONAL METAL CO. **MEXICO.**

Offices: 170 Broadway, New York, N. Y., and Apartado 71b, Mexico, D. F.

...ico office: Guadalajara, Jalisco, Mex. C. B. Lewis, president; H. B. Lewis, ...president and general manager; D. C. Doney, metallurgist. Apparently ...n auxiliary of the American Smelting & Refining Co. Has sampling plants ...Chihuahua; Guanaceví, Durango; Ameca and Guadalajara, Jalisco; ...ca and Temascaltepec, Mexico; San Luis Potosí; Hermosillo, Sonora, and ...ales, Arizona. Also has purchasing agencies at various other points in the ...ican Republic. Had a refinery at Nonoalco, and sold same, circa December, ...7, to Société Affinage des Metaux.

TIONAL METALLURGICAL CO. **MEXICO.**

Office: 1503 Arrott Bldg., Pittsburg, Pa. Mine office: Matehuala, Catorce, ...Luis Potosí, Mex. D. C. Noble, president; C. H. Fogg, vice-president; J. McConnell, treasurer and chairman board directors; preceding officers, Gen. Ladd, Jas. A. Steele, J. H. Douglas and H. N. Nichols, directors; W. A. ...ifith, secretary; Samuel James, general manager; A. P. Callender, general ...nt; H. T. Schmidt, mine superintendent; W. E. Newnam, smelter superin...dent; Grattan Foley, cashier.

Organized August, 1901, under laws of Colorado, with capitalization ...00,000, shares $25 par. Debentures, $500,000 authorized, at 6%; issued, ...2,000. Annual meeting, last Tuesday in July. Holds lands through a Mexi... corporation, the Compañía Metalurgica Nacional.

Lands are circa 1,300 acres, and a 160-acre millsite, in the Matehuala and ...Saludo subdivisions of the Catorce district. Property shows limestone meta...rphosed by intrusive granite-porphyry, ore bodies occurring as irregular ...tart deposits in an altered zone of garnetiferous limestone and wollastonite. ...company's lands carry 26 known ore bodies, of which 7 are more or less ...eloped, these ranging from 3' to 120' in width, and from 200' to 1,200' length; ...e bodies being under development at present. Ores are mainly galenite, ...nite and chalcopyrite, carrying estimated averages of 5% copper, 6 oz. silver ...2 gold per ton.

Lands include mines known as La Colorina, Santa Ana, Las Agustias, Santo ...nio, Monte Celeste, Alpha and Beta mines.

Principal openings include the 200' Aarons shaft; 200' El Carmen shaft; ...Santiago shaft; 1,000' El Carmen tunnel; 900' No. 2 tunnel; 350' Russian ...nel, and 600' Portero tunnel, all tunnels being crosscuts, with about 25 ...er tunnels and cuts, with a total of circa 6,500' of workings.

La Colorina y Anexos, opened by shaft and tunnel, have ore carrying 5 to ...% copper, circa 250 grams silver and 2 grams gold per metric ton, and were ...d September, 1906, to be shipping 50 tons of ore daily.

Las Agustias mine has a shaft with circa 2,000' of workings, ore averaging ...ut 10% lead and 20 oz. silver per ton.

Santa Teresita mine, developed by shaft, with about one-half mile of open..., has silver-lead ore averaging circa 10% lead and 20 oz. silver per metric ...

Santa Ana mine, opened by tunnel, has a silver-lead vein carrying 10%... ...ad and 20 oz. silver per metric ton, and also has undeveloped silver-lead ores.

Mining equipment is slight, including a 25-h. p. gasoline hoist and a 10x10' ...t three-compartment.

There are 8 buildings at the mine, including office, assay office and dwell...s.

The principal mines are connected with the smelter by the 7-mile Matehu... narrow-gauge railroad. A spur of the Mexican Central railway runs into ...melter.

The smelter, according to the mill and hoist, and doing a general custom ...ess, in addition to treating the company's own ores, is of 500 tons rated

daily capacity, having 150-ton and 200-ton water-jacket blast-furnaces lead and one for copper, with a 30-ton reverberatory furnace, calcining briquetting plant and a small sampling mill, the reverberatory being treating flue dust. Product is matte averaging circa 45% copper, 5 oz. silver and 1 oz. gold per metric ton, shipped to the Aguascalientes for refining.

The power plant at the smelter includes three 125-h. p. boiler 275-h. p. Corliss tandem-compound engine, direct-connected to a 150-h. p. generator, with a number of smaller dynamos and motors.

Miscellaneous enterprises include a brick plant with a capacity o finished brick daily, and the company holds various government fr and concessions, and plans securing a water supply from a distanc miles, and furnishing water to the city of Matehuala.

Production, 1906, is reported by company as 2,295,270 lbs. fine co addition to lead, silver and gold. The mines and smelter employ ci men, mainly at the reduction plant.

The company was promoted from Denver, and estimates of pro profits made by the promoters, while placing stock, were ridiculously h the present management apparently has no connection with the origi moters, and seems operating along sound lines.

NATIONAL MINES CO.

Office: Portland, Ore. Mine office: Weiser, Washington Co., Ida Trevor, vice-president. Lands, 20 claims, in the Seven Devils district, on the King group, a 275′ tunnel with 100′ blind shaft at its end, show assaying up to 5% copper, 33% lead, 90 oz. silver and $2.50 to $5 gold

NATIONAL MINING CO. BRITISH COLUMBIA & CALIF

Office: Tacoma, Wash. Mine office: Waldo, Josephine Co., Ore Pritchard, president; Geo. P. Larsen, secretary; John Sanger, superin Capitalization $10,000,000. Property is the Sanger group, 35 claims, a acres, in Del Norte county, California, shortly south of Waldo, also mining claims in British Columbia, "oil lands" in western Washing several mining claims in the lower Arrow Lake district, British Columb Sanger ores give good assay values in copper and gold: Capitalizatio cessive and claims made for company even more inflated. Idle and pre moribund.

NATIONAL MINING CO. MICH

Office: 15 Congress St., Boston, Mass. Mine office: Rockland, On Co., Mich. John C. Watson, president; Alvin R. Bailey, secretary an urer; preceding officers, F. H. Raymond, Geo. H. Flint and Capt. Jas. C eth, directors. Organized 1848, and rechartered 1878, with capitaliza creased later to $2,500,000, shares $25 par; issued, $1,875,000. In No 1908, company had a floating debt of circa $25,000. Has paid divid $320,000.

Lands lie west of the old Minesota mine, now owned by Michigan Mining Co. The National has produced nearly 6,000 short tons of fine but has been idle since 1893. At last accounts management was makin tive plans for resumption. Fully described Vol. II.

NATIONAL MINING & DEVELOPMENT CO. WYO

Office: 1314 Eleventh St., N. W., Washington, D. C. Mine office: Frémont Co., Wyo. Chas. Jacobsen, president; H. Clay Browning, J president; Melvin A. Wertz, secretary; preceding officers, J. Frank Hess, E. Burklin, John H. Muirhead, John R. Galloway, Burt H. Brockway an J. Berner, directors; Col. John T. Wertz, general manager; A. L. LaVi *gineer.* Organized May 22, 1903, under laws of Maine, with capita *$500,000,* shares $10 par. Annual meeting, first Monday in June.

Lands, 43 claims, unpatented, area 875 acres, in the Willow Creek district, showing about a dozen ore bodies, of which 5, mainly fissure veins, are under development, these being estimated by company to average 25' width and to be traceable 5 miles, carrying an average of 8% copper, up to 100 oz. silver and up to $2 gold per ton, mainly from chalcopyrite with quartz gangue, which figures are excessive. Development is by 5 pits and shafts, deepest 60', and by 3 tunnels, longest 93', with 378' of workings. Property is 30 to 35 miles from nearest railroads.

NATIONAL MINING EXPLORATION CO. **ARIZONA.**

Office: 1012-60 State St., Boston, Mass. Mine offices: Globe, Gila Co., Ariz., Kelvin, Pinal Co., Ariz., and Safford, Graham Co., Ariz. Hon. Chas. M. Bruce, president; Wm. W. Williamson, vice-president; Jas. A. Otis, secretary and treasurer; Frank A. Woodward, general manager. Organized November, 1905, under laws of Maine, with capitalization $1,500,000, shares $1 par; issued, $796,013. Authorized, Sept. 21, 1908, an issue of $250,000 first-mortgage 10-year 5% gold coupon bonds, convertible into stock at par at any time within 2 years, and retirable by company at any time on 60 days' notice, at 5% premium. Bond issue apparently was not put out, though supposed to be placed, and money advanced the company thereon. A note, supposedly for advance on bond issue, is said to have been repaid, November, 1908.

Lands are in 3 groups in Gila, Pinal and Graham counties, Arizona, the principal property being at Globe.

The Iron Cap group of 7 claims, patented, area circa 130 acres, at Globe, is well located between the two properties of the Arizona Commercial, and not far from the Superior & Boston. The upper workings of the Iron Cap show leached ore, with promising ore in the lower workings, the mine having nearly a mile of openings. A crosscut from the 350' level has cut what is believed to be an extension of either the Black Hawk or Old Dominion fissures, presumably the former, considerably leached, but with indications of good ore at a little greater depth, this being circa 14' wide, with a paystreak of 20" to 24" of commercial ore. The company plans locating a new 3-compartment shaft, early 1909, and shipped, circa August, 1908, to the Old Dominion smelter, some ore returning net values of $8.08 per ton.

The Fumarole group, of 15 claims, circa 10 miles south of Safford, shows an oval ore body, circa 125x160' in extreme area, with a 700' two-compartment shaft, near the centre, having levels opened at depths of 200' and 500', with about a quarter-mile of workings. Apparently the Fumarole has a pipe vein, carrying gold in a disintegrated quartz gangue, ore assaying $5 to $16 gold per ton. Active development is in progress at the Fumarole.

The Copper Ridge group, 8 claims, area 160 acres, lying on the northern bank of the Gila river, circa 7 miles west of Kelvin, shows 3 veins, in a mineralized zone of circa 500' width, opened by an old 130' shaft. The Copper Peak group, on the northern bank of the Gila River, circa 2 miles southwest of the Copper Ridge, has a 100' tunnel in conglomerate. Apparently both of the Pinal county properties are idle.

NATIONAL MINING & INVESTMENT CO. **MONTANA.**

Mine office: Butte, Silver Bow Co., Mont. Is said to hold an option on a controlling interest in the stock of the Farrell Copper Co.

NATIONAL MINING & MILLING CO. **COLORADO & WYOMING.**

Dead. Formerly at Pearl, Larimer Co., Colo. Fully described Vol. VI.

NATIONAL MINING & SMELTING CO. **MONTANA.**

Dead. Changed title, 1906, to New York & Saltese Copper Mining Co. Formerly at Saltese, Missoula Co., Mont.

NATIONAL RADIUM & COPPER CO. COLORA

Dead. Formerly at Denver, Denver Co., Colo. Described Vol. VI.

NATIONAL SMELTING CO. MEXI

Office: 2030 Land Title Bldg., Philadelphia, Pa. Mine office: Cha huites, Sombrerete, Zacatecas, Mex. L. H. Taylor, Jr., president; Richar Park, vice-president; Paul W. Meyers, secretary; John J. Little, treas preceding officers, John P. Logan, Clarkson Clothier and John P. Whi directors; Theo. Montgomery, general manager; John M. Bell, mine sup tendent; Albert R. Wores, smelter superintendent; Henry Carnaghan, superintendent. Organized March 27, 1906, under laws of Maine, with cap zation $1,000,000, shares $5 par; issued, $389,375. Formerly had a $1 bond issue, at 6%, which has been converted into stock, at par. Divi 1907, were $14,000. The company reports that it has no debts or liabi other than outstanding capital stock, and that properties are free from incumbrances. Annual meeting, first Monday in June.

Lands, 194 pertenencias, held through a Mexican incorporation, kno the Compañía Minera y Beneficiadora de Minerales de Chalchihuites, There also are 38 acres of mill and smelter sites and sundry water r mining lands being in 10 groups, in the Sombrerete district.

The property shows limestone, with frequent intrusions of eruptive carrying fissure veins in the eruptives, and contact deposits between ig rocks and limestone, and in limestone near the point of contact. Ore are mainly in silver-lead.

The company's mines consist of the Colorado silver-lead mine, San silver mine, Anaconda mine of iron ore flux, Esplendida gold mine, El and El Tigre silver-gold mines, Estufa silver-lead mine, Constancia silv mine, Santa Rita de Las Boas mine, and stock control of the Núngano lead-copper mine. The company has state concessions exempting it taxation and granting various privileges.

The Anaconda mine shows a 36′ vein, mined open-cast, carrying so averaging 2.5 to 3% copper. The Núngano has an ore body of 6′ to 15′ developed for 120′ in length and 160′ in depth, giving ore of 2.5 to 3% tenor, opened by shafts of 30′, 60′ and 160′, and by tunnels of 250′ an being estimated to show 100,000 tons of ore, which seems high. The mines carry silver-lead ores, mainly auriferous, ranging in tenor from 45% lead, 10 to 50 oz. silver and $2 to $5 gold per ton. The mines ha tensive openings, but were not developed in a systematic manner, b former owners, having been opened in the Seventeenth Century, and, taken over by present company, July, 1906, had been worked, from 1850, in a small way, by local owners, the mines being operated exclu by hand-power, with malacates, and the ores reduced in adobe smelters.

Equipment includes a 30-h. p. producer gas engine, with malacates a different mines for hoisting, and stoping is entirely by hand. Buildings, 20 in number, mainly of timber and adobe, include a 20x20′ carpente 50x60′ machine-shop and 20x25′ smithy.

The concentrator, of wood and iron, of 60 tons daily capacity, 14x17″ Dodge crusher, 2 pairs of rolls, 3 New Century jigs, 2 Standar centrating tables and settling tanks.

The smelter, at Chalchihuites, is 2 to 12 miles from the various receiving ores by burros and wagons. Equipment of the smelter incl brick stall calciners, a 10-ton reverberatory furnace and 40-ton and water-jacket blast-furnaces, latter working interchangeably on lead and ores. The smelter has circa 125 tons daily capacity, product bei lead-silver bars, with some copper matte averaging about 45% co

and 2 oz. gold per ton, sent to the Aguascalientes smelter for re-
e works do a general custom smelting business.
mpany, in its short career, has met with a variety of misfortunes,
involved in legal difficulties upon the completion of its smelter.
adjusted, temporarily, in September, 1906, but in June, 1907, new
ose, and were adjusted February, 1908, leaving the company free
and in full legal possession of its properties, but without working
resumption.

L SMELTING & REFINING CO. **NEW MEXICO.**

Formerly at Lordsburg, Grant Co., N. M. Described Vol. V.

OPPER CO. **MICHIGAN.**

68 Devonshire St., Boston, Mass. Mine office: Delaware Mine, Co., Mich. M. Augustus O'Neil, president; F. W. Morandi, secre-reasurer. Lands, 480 acres, being the South ½ of Section 3 and ¼ of Section 10, Town 58 North, Range 30 West. A little work on a fissure vein crossing the ashbed, 1852-1855, company levying s of about $39,000. Since idle.

OPPER MINING CO. **NEVADA.**

Reno, Nev. Mine office: Yerington, Lyon Co., Nev. Benj. Cur-ent; H. Pennington, vice-president; Sophia Knox, secretary and preceding officers, John Pothoff, Theresa Pennington and F. B. King, Organized under laws of Nevada, with capitalization $500,000, ar. Lands 3 miles west of Yerington, said to be near the Bluestone, l to have an 8′ vein, carrying auriferous and argentiferous copper ree gold, opened by 3 short tunnels, longest, 185′.

OPPER MINING CO. **NEW MEXICO.**

Succeeded, 1907, by Native Copper Mining & Smelting Co. For-Hanover, Grant Co., N. M.

OPPER MINING & SMELTING CO. **NEW MEXICO.**

nd mine: Hanover, Grant Co., N. M. Organized 1907, under laws exico, with capitalization $5,000,000, as successor of Native Copper

MINERA NATIVIDAD. **PERÚ.**

ffice: Morococha, Junín, Perú. Nicholás Azalia, manager; Manuel uperintendent. Employs 114 men. Organized 1895, under laws of ds, 4 pertenencias, showing a vein with northeast and southwest ed by a 360-meter tunnel, with upper workings practically barren, elow the barren zone by very evenly mineralized ore that is mainly e and tennantite, associated with pyrite. For first 9 years of opera-ge smelter returns were 21.65% copper and 530 grams silver per with a total production of 2,988,300 kilograms fine copper, and ams fine silver. Production, 1904, was circa 2,400 metric tons of elding 1,058,108 lbs. fine copper.

G MINING CO. **MICHIGAN.**

nd mine: Houghton, Houghton Co., Mich. Thos L. Chadbourne, o Dec. 31, 1871, old company of this name had levied assessments Lands, 400 acres, being the N. ½ of Section 3, and the N. ½ of ection 3, Town 54 North, Range 34 West. Has a 112′ shaft, sunk ince idle, until 1907, when diamond drilling was begun. Property that it should carry the southern extension of the Pewabic lode y.

RG FALUN COPPER MINES & WORKS, LTD. **SWEDEN.**

25-35 New Broad St., London, E. C., Eng. Mine office: Falun, pparbergslän, Sweden. *J. Lee*, chairman; R. W. Blackburn,

secretary. Organized July 5, 1907, under laws of Great Britain, with capitalization £100,000, shares £1 par, in 20,000 A shares and 80,000 B shares; issued, £5,200, in A shares. Production, 1902, under old ownership, was 361,800 kilograms of low grade copper matte.

NAVY GOLD & COPPER MINING CO. **WASHINGTON.**

Mine office: Orient, Ferry Co., Wash.

NEEDLES EYE COPPER MINING CO. **CALIFORNIA.**

Letter returned unclaimed from former mine office, Needles, San Bernardino Co., Cal. Organized May, 1907. Lands, 11 claims, circa 7 miles from Needles, having a 100′ shaft, said to show a little good ore. Company apparently has claims also in Dulzura, Rawhide and other mining camps in the southwest. Apparently organized mainly to sell stock.

NEEDLES SMELTER. **CALIFORNIA.**

Owned by Arizona-Mexican Mining & Smelting Co.

NELSON COPPER FIELDS, LTD. **BRITISH COLUMBIA.**

Dead. Formerly at Nelson, Kootenay district, B. C. Described Vol. VII.

NELSON COPPER MINING CO. **NEVADA.**

Dead. Formerly at Amos, Humboldt Co., Nev.

NELSON COPPER SYNDICATE, LTD. **BRITISH COLUMBIA.**

Mine office: Nelson, Kootenay district, B. C. Organized January, 1905, under laws of British Columbia, with capitalization $10,000, shares $100 par. Idle and apparently moribund.

MINAS DE COBRE DE NERVA, S. A. **SPAIN.**

Office: Madrid, Spain. Mine office: Valverde del Camino, Huelva, Spain. Sr. Don Andres Mellerdo, president; Marquess de Portago, vice-president; E. Sanchez Ocaño, secretary; J. J. C. Fernan, general manager; Chas. Haase, smelter superintendent. Organized April, 1907, under laws of Spain, with capitalization 20,000,000 pesetas, in 250,000 shares of 50 pesetas par, fully paid, and 15,000 shares of 500 pesetas par in deferred stock. Dividend rate is 4% for 3 years on the preferred shares. Company reports three dividends of 2 pesetas each, for three half-years ending Dec. 31, 1907, amounting to 750,000 pesetas.

Lands, formerly held by Arenillas Copper Mines, Ltd., which was liquidated May, 1904, include the Chaparrita group, in the commune of Nerva, and the Ratera group, 8 kilometers from a railroad station. Company reports that its ores are cupriferous pyrites, averaging 3.5% copper, which estimate is considered excessive. Company reports steam plants of 250 h. p. at the mines and 400 h. p. at the smelter.

The company reports a 300-ton smelter, 2 miles from the mine, receiving ore by rail, having 2 water-jacket blast-furnaces, with a converter department having one stand, turning out blister copper of 98% tenor, carrying small quantities of silver, the works doing custom smelting also.

The company reports that its mine is served by its own 5-mile branch railroad, to Buitron. The company reports that production for 1906 was nil, but says nothing about production for later years.

The prospectus issued by this company, or by some other person interested in pushing its shares, was most misleading. The compiler of the prospectus in question secured, presumably by accident, a photograph of the village at the mines of the Compañía del Castillo de las Guardas, showing a hospital, etc., and printed a reproduction of this photograph in the prospectus, but the Castillo de las Guardas mines are 150 kilometers from La Ratera. The same careless compiler of prospectii also secured a photograph showing the shipping facilities of the Sotiel Coronada mine, instead of the Nerva, and *this also* appeared in the prospectus. Under these circumstances, and because

e capitalization, the company is viewed with suspicion, notwithe fact that its president is a senator of the Spanish Cortes, and ident a member of the Spanish grandezza.

GOLD & COPPER MINING CO. **NEVADA.**

402 Majestic Bldg., Denver, Colo. Letter returned unclaimed r mine office, Ely, White Pine Co., Nev. David J. Reed, president; lerson, vice-president; Albert L. Hiller, secretary and treasurer; fficers, Dr. C. S. Roberts and Geo. A. Huestiss, directors. Organ- laws of Arizona, with capitalization $3,000,000, shares $1 par. ide the Portland group, 6 claims, area 440 acres, in the Ely dis- claims in the Bullfrog district, and company is said also to have Searchlight. Cannot be learned that any work is in progress, and pparently was promoted mainly to sell shares.

NN & CO. **CAPE COLONY.**

ffice: O'okiep, Little Namaqualand, Cape Colony. Did some de- work on copper lands, circa 1903. Presumably idle.

BELL COPPER MINING & REDUCTION CO. **NEVADA.**

Formerly at Lovelock, Humboldt Co., Nev. Fully described Vol. VI.

BLACKHORSE MINING CO. **NEVADA.**

returned unclaimed from former mine office, Black Horse, White Nev. Organized circa April, 1907. Idle and apparently moribund.

BONANZA COPPER CO. **NEVADA.**

care of Freeman Morningstar, president and general manager, City, Utah. Mine office: Aurora, Esmeralda Co., Nev. Lands, 15 rtly west of the Ludwig mine, showing ore assaying 5 to 15% $4.15 gold per ton.

BRITON MINING CO. **NEVADA.**

care of Alfred Fletcher, president, Leeds, Eng. Letter re- laimed from former mine office, Golconda, Humboldt Co., Nev. ker, general manager; Wm. F. Fletcher, secretary. Capitalization shares $1 par. Lands, sundry claims, known as the Chief of the , in the Cherry Creek district, west of the Adelaide Star Mines,

BUNKER HILL MINING CO. **NEVADA.**

Elko, Nev. Mine office: Bullion, Elko Co., Nev. Employs 8 Johnson, president; W. W. Booker, vice-president; Frederick Davis, nd general manager; John Henderson, treasurer; preceding officers, and Chas. E. Van Barneveld, directors. Organized Apr. 28, 1905, of Navada, with capitalization $2,000,000, shares $1 par. 20 claims, area circa 320 acres, 10 miles from a railway and about uth of Elko, showing argentiferous and auriferous copper, lead, ron sulphides. Has a 15-h. p. gasoline air-compressor. In 1907 2 tons of ore to Salt Lake smelter, securing therefrom average irca 6% copper, 12% lead, 6% zinc and 20 oz. silver per ton. Com- continuous development and production.

CALIFORNIA PROSPECTING CO. **CALIFORNIA & NEVADA.**

returned unclaimed from former office, Hall St., Goldfield, Nev. Greenwater, Inyo Co., Cal. Robt. T. Todd, president; Milton M. president; T. F. Carney, treasurer; J. B. Hainer, secretary; pre- rs. Lewis W. Aubury, N. M. Willett and Leonard Merrell, directors. nder laws of Nevada, with capitalization $240,000, shares $240 , 27 claims, circa 30 miles west of Goldfield, 6 claims in the Tule 10 claims in the Greenwater district. Presumably idle.

CALUMET COPPER MINING CO. **NEVADA.**

52 *Journal Bldg., Boston, Mass. Mine office:* Buckskin, Lyon Co.,

Nev. John D. Kazar, president and general manager; Francis E. Higgin vice-president; John O. Brigham, secretary; Chas. E. Hayes, treasurer; pr ceding officers, Arnold Schaer, Henry A. Stearns, Thos. Malcolm, Geo. W Dryden and Wm. E. Blanchard, directors; Philip J. Stacey, superintendent Arthur Prill, engineer. Organized May 4, 1907, under laws of Arizona, wit capitalization $200,000, shares $5 par.

Lands, 22 claims, unpatented, area circa 440 acres, 6 miles northeast of Buckskin and circa 10 miles northwest of Yerington, showing diorite, porphyry and silicious limestone, carrying 3 contact deposits with gossans estimated as averaging 12′, 30′ and 40′ in width, and traceable 500′ to 1,200′, of which two, under development, opened by vertical shafts of 60′ and 200′, show cuprite, malachite, chalcocite and chalcopyrite, giving assays of 4 to 6% copper and $5 to $8 gold per ton.

Equipment includes two 25-h. p. gasoline hoists, good for 600′ each and 5 mine buildings, including a 20-room boarding house. Company plans continuous development and deepening both shafts to 500′. While no great quantity of ore has been developed as yet, the cappings are wide and promising, and if the company continues development, its prospects of finding a mine are considered fair.

NEVADA CARBONATE COPPER MINING CO. NEVADA.

Letter returned unclaimed from former office, Globe, Ariz. Mine office: Siegel, White Pine Co., Nev. D. A. McCarthy, president and treasurer; A. J. Rieman, vice-president; M. E. Brooke, secretary. Organized Oct. 10, 1906, under laws of Arizona, with capitalization $1,000,000, shares $1 par. Lands, 120 acres, adjoining the Vulcan, having a 33′ tunnel.

NEVADA CENTRAL COPPER CO. NEVADA.

Office: 157 Michigan Ave., Chicago, Ills. Mine office: Palisade, Eureka Co., Nev. Col. Chas. Lay, president; Geo. W. Leighton, vice-president; Robt. L. Benson, secretary and treasurer; preceding officers, Wm. Andrews, Jos. D. Wright, John A. Saull and Edwin L. Wilson, directors. Organized under laws of District of Columbia, with capitalization $1,000,000, shares $10 par, in $750,000 preferred non-cumulative 7% stock and $250,000 common stock.

Lands, 10 claims, area 200 acres, in the Antelope district, on the western slope of the Sulphur Mountains, opened by a 130′ shaft, showing ore said to give average assays of 21% copper. There is some litigation over titles, but company seems likely to win out. Property formerly was held by Whalen Consolidated Copper Mining Co., for which Wm. Whalen, while president, secured large sums, but did little work. Whalen eventually was driven out by shareholders, but not until he had destroyed the standing of the company, so that it went to pieces in 1903. Whalen is in prison at San Quintin, California, sentenced to 10 years for swindling women of Sacramento and Minneapolis out of about $8,000, on alleged gold mines at Alpha, this being Whalen's second sentence, as he served 5 years in the Missouri penitentiary. The company has taken action in the Federal courts against Davies and others. The company seems to be making a brave fight against considerable odds. Only development work was in progress at last accounts.

NEVADA CENTRAL GOLD & COPPER CO. NEVADA.

Mine office: Pioche, Lincoln Co., Nev. R. D. Montgomery, secretary and treasurer; L. F. Peer, manager. Lands adjoin the Nevada Horn Silver Mining Co., in the Bristol district, and property was under development at last accounts.

NEVADA CHAMPION COPPER CO. NEVADA.

Office: care of J. C. McCormick, president, Goldfield, Nev. Mine office: *Mina*, Esmeralda Co., Nev. E. J. Amann, vice-president; C. M. Miller, secretary; F. M. Dorsey, treasurer; J. F. Meikle, general manager; preceding

rs and A. E. Beetles, directors; Geo. Oswell, superintendent. Organized February, 1907, under laws of Arizona, with capitalization $500,000, s $5 par.

Lands, 7 claims, area 130 acres, 9 miles northwest of Mina, carrying a 6' 5' contact deposit between limestone and quartzite. Has a 400' three com ment shaft, planning to be sunk to 700', and about 15 other shallow shafts, and tunnels, showing ore assaying 3.7 to 11.2% copper and up to 6 oz. r per ton. Sulphides were encountered at depth of circa 300'. Has con rable ore on the dumps, ranging 2 to 3% only in copper tenor. Is claimed ave contracted to furnished 100,000 tons of ore to a new smelter, but elopments scarcely seem adequate to warrant such a contract.

VADA-COLORADO COPPER CO. **NEVADA.**

Office: Colorado Springs, Colo. Letter returned unclaimed from former e office, Yerington, Lyon Co., Nev. Lands, 19 claims, near the Ludwig, to have been bought for circa $30,000. Idle.

VADA-COLORADO GOLD & COPPER MINING CO. **COLORADO & NEVADA.**

Office: care of B. Ross, general manager, Denver, Colo. Mine office: ho Springs, Clear Creek Co., Colo. Grant L. Hudson, president; Ben K. fy, vice-president; Robt. H. White, secretary. Capitalization, supposedly 00,000, shares $1 par. Lands, 7 claims, on Chicago Mountain, near Idaho ings, and 10 claims and a millsite in the Walker Lake district of Nevada. Colorado property has a 200' tunnel. Early 1908 was developing Colorado perties only.

VADA-COMMONWEALTH MINING & MILLING CO. **NEVADA.**

Office: 502 Hall Bld., Kansas City, Mo. Mine office: Galena, Lander , Nev. J. B. Hamner president; W. F. Miller, secretary and treasurer; W. Clapp, general manager; Jas. W. Boileau, engineer. Organized 1906, er laws of Arizona, with capitalization $10,000,000, shares $1 par, prac lly all issued.

Lands, 29 claims, 1 patented, area circa 400 acres, [illegible] wing 8 ore bodies, reported as fissure [illegible] 35' average width, of which 3 [illegible] rage of 1% copper, 1% lead, 5% [illegible] . A new ore body showing [illegible] give average assays of 6% copper [illegible] ton.

Development is by a shaft of [illegible] h about 5,000' of workings, [illegible] ut 500,000 tons blocked [illegible] is argentiferous and [illegible] sulphides, badly mixed [illegible]

Equipment includes a [illegible] ral mine buildings.

The mill, 70x150', of wood, [illegible] a 9x16" Blake crusher, 4 [illegible] g of the mill running [illegible]

The mine shipped [illegible] tons of low grade [illegible] and silver, with [illegible] g to low prices [illegible] hopes for [illegible]

ADA CONSOLIDATED COPPER CO. **NEVADA.**

Office: City Investing [illegible] Co., Nev. Jas. Phillips, [illegible]

G. M. Borden, secretary; preceding officers, W. Hinckle Smith, M. L. Col. Chas. Hayden, Wm. B. Thompson, F. W. Hills and J. K. MacGow rectors; Pope Yeatman, general manager; Jos. Gazzam, local manager; W. Cox, general superintendent; E. F. Gray, mine superintendent; Pe McCracken, chief engineer.

Organized Nov. 17, 1904, under laws of Maine, as a merger of the & Nevada Copper Co. and White Pine Copper Co., with capitalization $5,0 shares $5 par, increased, Feb. 5, 1908, to $8,000,000, shares $5 par, in being made to provide for retirement of a $3,000,000 issue of first-mo 6% convertible gold bonds, dated Apr. 1, 1908, due April, 1918, convertibl shares, at any time prior to Apr. 1, 1913, on the basis of $10 per shar redeemable, by company, at par, on one month's notice. Ended fiscal Sept. 30, 1908, with $793,940 in cash and call loans, with $178,152 in ac payable, and expenditures, to that date, aggregated $4,481,208. Stock is on the Boston Stock Exchange and New York Produce Exchange. Bosto Deposit & Trust Co., transfer agent. Annual meeting, first Tuesday vember.

The Nevada Consolidated is controlled by the Guggenheim int through their control of the American Smelting & Refining Co., through by latter of the American Smelters Securities Co., which controls the N Consolidated Copper Co., through the ownership of 51% of the stock issue

The company controls, through stock ownership, the Nevada No Railroad, circa 90 miles in length, running from Ely to Cobre Station, Southern Pacific Railway. Company also owns a half interest in the S Mining & Smelting Co., and a large share interest in the Cumberland-E par value of stock held in subsidiary companies, Sept. 30, 1908, being $4,8 The company's financial arrangements with the subsidiary and affiliate panies are not as clear as might be desired, and the reason for some juggling with shares and bonds, between the Nevada Consolidated, C land-Ely and subsidiary corporations, is not readily apparent.

Lands, 63 claims, partly patented, area circa 850 acres, being the group of 27 claims and the Ruth group of 36 claims. The company too the Chainman property, but surrendered it later.

Lands include properties formerly held by White Pine Copper Co. York-Nevada Copper Co., and sundry other corporations and individuals company also owns the Georgetown Ranch, area circa 320 acres, including able water-rights on Murray Creek, which carries a flow of 4,000,000 daily, assuring an ample water supply.

The company's mineral lands show an outcrop of gray sintery carrying occasional copper carbonates. One portion of the tract shows treme width of 2,000' of these croppings, below which, at a depth of circ are found low-grade ores in the original plutonic quartz-porphyry, the above being quite thoroughly leached. The upper workings show mel and chalcocite, changing at depth to sulphides, mainly disseminated chal with some chalcopyrite, associated with pyrite, in fine seams, and as a of the gangue rock, also occurring as speiss, disseminated through the mass. The ore body is without defined walls, the entire country rock impregnated by ore to a greater or less extent. The mine water is st impregnated with copper, causing trouble with pumps and pump-columns. mates of ore in sight vary greatly, but the tonnage is enormous. It wa mated, November, 1907, by Mr. Yeatman, a competent authority, th mine had in sight 14,432,962 tons of ore averaging 2% copper, with con gold and silver values of circa 15 cents per ton, and, at the end of 19 mine had blocked out nearly or quite 20,000,000 tons of ore.

The Ruth group includes the Ruth and Star Pointer mines, operate

he mines being connected by a 2,700' tunnel, with an extensive electric
e system, with practically all hoisting done through the Star Pointer
It is planned to use the caving system in the Ruth mine, as the ore is
nd can be broken cheaply. The Ruth has an incline shaft of circa 640'
, showing large bodies of low and medium grade ore, with a marked
ncy toward decreased values at depth, leading to the opinion that the
may have reached the bottom limit of payable ore. Mr. J. Parke Chan
estimated this mine, in 1903, to show 2,400,000 tons of ore, averaging
copper, 0.05 oz. silver and 0.02 oz. gold per ton, and the ultimate amount
e available in the Ruth obviously will be much greater than the original
mate. Surface improvements at the Ruth include an engine-house, board-
ouse, office, stable and numerous dwellings.

The Star Pointer mine has a mammoth 4-compartment shaft, of 3,500 tons
mated daily capacity. This great shaft has a timber compartment 9'
he clear, handling loaded timber cars on cages. The shaft has a 140' steel
igeur, on concrete foundations, perhaps the largest in the world, and the
pment includes a crushing plant.

The Eureka mine, or group of mines, shows ore of somewhat lower average
e than the Ruth group, though in larger tonnage, careful sampling of
ch, in 1905, gave average assays of 2.2% copper, 0.63 oz. silver and 0.02 oz.
l per ton. This group has 2 shafts, one being the Eureka, with vertical
th of 400', bottomed in poor ore, the other shaft being known as the Star
the West, but the Eureka group is being worked open-cast, by steam-shovel.
ore is very soft, but requires blasting, and holes of 50' to 670' depth are
led for the explosives, each blast breaking tremendous quantities of ground.
re are five 95-ton steam-shovels, with dippers of 2½ cu. yds. capacity, to
replaced by shovels with dippers of 5 cu. yds. capacity. In November, 1908,
one day, there was removed, by steam-shovels, 9,680 tons of overburden
l ore, of which circa 3,500 tons was ore. It is probable that the Eureka
up has little less than 20,000,000 tons of ore in sight, with every prospect
a much larger tonnage eventually.

Ore is milled and smelted by the Steptoe Mining & Smelting Co., a sub-
iary corporation, the works of which are separately described, under the
le of that company.

The Nevada Northern Railway Co., controlled by the Nevada Consolidated
pper Co., has a standard-gauge line of circa 90 miles length, running from
y to a junction with the Southern Pacific Railway at Cobre Station, 3 miles
st of Toano. Capitalization of the railway company is $3,000,000, with a
000,000 bond issue, at 5%. This line does a large general business, in addi-
n to handling the traffic of the Nevada Consolidated and affiliated companies.

Production for 1908, begun early in the year, was circa 20,000,000 lbs.
ally, for the Nevada Consolidated and Cumberland-Ely, of which the Ne-
da Consolidated had a major portion, and for August, 1908, the Nevada
nsolidated produced 785,706 lbs. fine copper. For September, 1908, the
mpany produced circa 46,000 tons of ore, putting about 12 into 1, ore assay-
g 2.7% copper and yielding an actual extraction of 69.3% of the assay
lues. The company hopes to make circa 25,000,000 lbs. fine copper in 1909,
d eventually production should be much larger. Finished product is handled
the American Smelting & Refining Co., on a 1% commission basis.

The Nevada Consolidated is a property of the first magnitude, and mining
s are said to be as low as 40 cents per ton, for steam-shovel ore. The prop-
has not been developed as rapidly as was anticipated at the time of or-
ization of the company, but the work has been well done, and there is no
stion about the great future of the mine.

NEVADA CONSOLIDATED COPPER & GOLD MINING & MILLING CO. NEVA

Dead. Formerly at Yerington, Lyon Co., Nev. Described Vol. VI.

NEVADA CONSOLIDATED EXTENSION CO. NEVA

Office: 475 Broadway, New York, N. Y. Mine office: Ely, White P Co., Nev. Organized circa 1907, under laws of Arizona, with capitaliz $1,000,000. Presumably idle.

NEVADA CONSOLIDATED MINES, LTD. NEVA

Dead. Reorganized, circa 1907, as Philadelphia Searchlight Gold & Co Mining Co. Formerly at Searchlight, Lincoln Co., Nev.

NEVADA CONSOLIDATED MINES & SELLING CO. NEVA

Office: 316 Lick Bldg., San Francisco, Cal. Alex Brown, president; C L. Newton, vice-president; F. G. Carey, treasurer. Lands are said to be Cat Creek, in Esmeralda county, Nevada, and company claims over 4,000 workings, which seems doubtful, and is said to plan a 100-ton concentra Officers are said to stand well, but the company's advertising is not liked.

NEVADA CONSOLIDATED SMELTING & REFINING CO. NEVA

Letter returned unclaimed from former office, 201 Exchange Bldg., Den Colo. Works office: Pioche, Lincoln Co., Nev. Wm. Gelder, manager. practically a subsidiary corporation of the Bristol Copper Mining Co., s reorganized, and stock is said to have been furnished gratis to shareho of the latter. Property is a 200-ton smelter and a 22-mile narrow-gauge road. At last accounts was in debt and moribund.

NEVADA COPPER CO. NEVA

Office: 372 Bullitt Bldg., Philadelphia, Pa. Operating office: Tono Nev. Mine office: Mina, Esmeralda Co., Nev. John W. Brock, presid Chas. R. Miller, vice-president; C. A. Higbee, secretary and treasurer. L near the Blue Light mine, include the Dunlap property. Company declined furnish a statement, September, 1908, and presumably is idle.

NEVADA COPPER CO. NEVA

Office and mine: care of W. K. Robinson, secretary, Goldfield, Esmera Co., Nev. Organized 1907, under laws of Arizona, with capitalization $2,000,0 shares $1 par. Lands, 4 claims, including the Blue Jay and Gold Coin, circa miles northwest of Goldfield, said to show argentiferous cuprite averaging copper. Presumably idle.

NEVADA COPPER CO. NEVA

Dead. Merged, 1902, in Nevada Bell Copper Mining & Reduction Formerly at Lovelock, Humboldt Co., Nev. Described Vol. II.

NEVADA COPPER CO. NEVA

Mine office, Sandy, Lincoln Co., Nev. N. M. McFatridge, presid Lands, 13 claims, showing an auriferous copper vein, assaying up to copper and $20 gold per ton, paralleled by a silver-lead vein, showing assay values up to $150 per ton, opened by a 90' shaft. A small smelter ment, circa 1906, to El Paso, gave returns of 50% copper, with gold and s values. Idle.

NEVADA COPPER CO. NEVA

Mine office: Yerington, Lyon Co., Nev. Lands are said to show a of 60' to 100' width, opened by a 330' main shaft. Company is said to the old Boston & Nevada smelter, across the river from Yerington. Idle apparently moribund.

NEVADA COPPER CO. NEVA

Letter returned unclaimed from former mine office, Ely, White Pine Nev. Organized, 1906, by residents of Spokane, Washington. Lands 12 claims, adjoining the Vulcan, said to carry carbonate and sulphide per ores.

.DA COPPER BUTTE MINING CO. **NEVADA.**

ffice: 2376 Mission St., San Francisco, Cal. Letter returned unclaimed former mine office, Austin, Lander Co., Nev. J. Herbert Reeve, presi- A. L. Hanson, vice-president and treasurer; Peter McAuslan, secretary; ling officers, H. W. Matthews and F. A. Limbaugh, directors. Organized 18, 1906, under laws of Nevada, with capitalization $500,000, shares 50 par.

ands, 5 claims, area 100 acres, in Trenton Cañon, near Valmy, in the Mountain district, said to show a vein of argentiferous and auriferous r ore up to 90′ in width, opened by tunnels of 40′, 50′ and 60′, yielding ssaying up to 11.2% copper, 10 oz. silver and $2.20 gold per ton. Pre- ly idle.

ADA COPPER MINING & SMELTING CO. **NEVADA.**

)ffice: 806-25 Broad St., New York, N. Y. Mine office: Cuprite, Esmer- Co., Nev. Col. Oliver P. Posey, president; Hon. W. E. Mitchell, vice- lent; W. M. Hoagland, secretary and treasurer; preceding officers, Wm. y, R. F. Stewart and Edwin B. Tustin, directors. Organized Aug. 28, under laws of Maine, with capitalization $5,000,000, shares $5 par. Owns trolling interest in the Lida Thanksgiving Gold Mining Co., at Lida, Nev. Lands, 85 claims, area circa 1,700 acres, in 3 groups, circa 4 miles apart, ling the Cuprite group of 50 claims, the Rea group of 20 claims and the t group of 15 claims. Company also owns a townsite. The Parrot group, ly developed by shafts of 55′ and 70′, is said to show a 12′ vein of ore ging 10 to 15% copper, which is doubted. Ores are said to carry copper, silver and gold.

Early 1907 the company planned building a 500-ton smelter, and at last nts was talking of building a smelter at Mina, Gillies, Goldfield, or else- e. Financial statement, as of date Aug. 1, 1907, gave total receipts of 95, with expenditures leaving a balance of $202,013, mainly in form of receivable, and a stockholders' committee has been appointed, to investi- the company, on an accusation of making fraudulent claims. Company arded with suspicion.

ADA COPPER, PLATINUM & NICKEL CO. **NEVADA.**

ffice and mine: Bunkerville, Lincoln Co., Nev. Property is the Great rn group, with about one-fourth mile of openings, said to show ore av- g about 4% copper, 2.5% nickel and one-third oz. platinum per ton. Pre- ly idle.

ADA COPPER QUEEN MINING & MILLING CO. **NEVADA.**

ffice: care of Raymond D. Frisbie, fiscal agent, Tonopah, Nev. Letter ed unclaimed from alleged former mine office, Mina, Esmeralda Co., Nev., notation from postmaster that no such company is known there. Lands ed were 5 claims, 7 miles northwest of Mina. Is not regarded favorably.

ADA DEVELOPMENT CO. **NEVADA.**

)ffice: 201 Walnut Place, Philadelphia, Pa. Mine office: Lovelock, Hum- Co., Nev. Theo. H. Lowe, superintendent, at last accounts. Lands are opper Glance group and adjoining claims. Idle several years.

ADA-DOUGLAS COPPER CO. **NEVADA.**

)ffice: 60 State St., Boston, Mass. Operating office: 306 Auerbach Salt Lake City, Utah. Mine office: Yerington, Lyon Co., Nev. Em- 60 men. J. D. Wood, president; Frank J. Hagenbarth, vice-president; r C. Orem, secretary and general manager; Windsor V. Rice, treasurer; ling officers, A. J. Orem, H. P. Henderson, E. R. Hastings, Frank A. er and Arthur L. Pearse, directors; S. S. Arentz, superintendent; C. S. , engineer. Organized Sept. 4, 1906, under laws of Utah, with capital- $5,000,000, shares *$5 par; issued, $3,750,000.* Debentures, $600,000 6-pct.

mortgage 5-year 6% convertible bonds, issued May 1, 1908, convertible in stock on basis of $7.50 per share. Of the 250,000 shares remaining unissued 80,000 have been set aside for conversion and redemption of bonds. Of the bond issue $500,000 was issued to pay balance due on the Ludwig mine.

Lands, 30 claims, area circa 550 acres, also 80 acres in two millsites, with miscellaneous lands, including water-rights, giving total holdings of circa 700 acres, in the Buckskin district. Property includes former holdings of the Douglas Copper Mining Co. and Ludwig Copper Mining Co. The original group of 11 claims formerly was owned by the Douglas Copper Co., these and adjoining claims, circa 7 miles west of Yerington, lying at an average elevation of one mile above sea-level. The Ludwig group included 2 patented claims and 3 claims formerly in conflict with the Nevada-Douglas. There also is one claim carrying fluxing iron ore, at Buckskin, several miles distant.

The property shows granite-porphyry and wollastonite, carrying fissure veins and contact deposits, and is said to have 3 different intersecting ore systems. The principal ore bodies consist of contact metamorphic deposits, with quartz fissures carrying oxidized ores and cupriferous pyrite, mainly in wollastonite, walls being strongly impregnated with ore. The property shows very strong and promising gossans, the surface carrying low grade oxidized ores of about 2% copper tenor, followed by low grade garnetiferous sulphide ores of circa 3% tenor, and, at depth, by sulphide ores of 5 to 6% copper tenor. At surface and to depth of circa 10' the property shows oxidized ores and chrysocolla, succeeded by a secondary zone carrying oxidized ores and secondary sulphides. The zone of oxidation and secondary enrichment apparently extends to depth of 500', giving an ore zone of 100' to 400' thickness, in wollastonite, with claimed superficial area of 1,800,000 square feet, or approximately 42 acres, in addition to strong gossans showing elsewhere on the property. The principal ore body is chalcopyrite, associated with pyrite, in granules, in wollastonite. The vein system has a generally meridional strike, with average dip of circa 60°, and the 3 principal veins, of about 20' average width, are estimated by company to carry an average of 6.5% copper.

The Douglas mine has a number of shallow shafts and open-cuts, in addition to the main workings, which include the 2,500' Douglas tunnel, planned to cut the main ore body at a vertical depth of circa 600', and 3 shafts, known as the Sunlight, Double Ess and Amalgamated, latter vertical. The mine as a whole has about 7,500' of workings, showing large quantities of sulphide ore, with circa 150,000 tons of 3% ore blocked out, latter in the upper levels, with high grade ore ranging 10 to 30% in copper tenor. Ore has been proven to a depth of 700' below the base of the mountain, and the lower levels show a sulphide ore body ranging upwards of 300' in length and up to 80' in width, giving a general average sample of 6.5% copper and 20% iron.

The Ludwig mine, bought June 29, 1907, for a price said to have been $1,000,000, includes 2 claims, on which the mine is opened, and a 40-acre tract in Smith Valley having a well and pumping station. The Ludwig, about one mile northwest of the main workings of the Nevada-Douglas, is developed by a 400' vertical shaft, work by former owners being poorly planned, but the property was a shipper of small quantities of high grade auriferous and argentiferous ore for some years, production including some very handsome malachite and azurite, a portion of which was sold to lapidaries. The old ore bodies of high grade have been developed more extensively, and new ore bodies have been found, these including both oxidized ores and sulphides, with some carbonate ore assaying up to 25% copper, and a fair showing of chalcocite. The Ludwig mine was opened circa 1865, and was worked, at intervals, for bluestone and high grade copper, having been last reopened 1905.

at Ludwig's four 100-h. p. hoists, good for 1,000' depth each, and
-stage belt-driven air-compressor.
power is generated by electric power, transmitted 20 miles from
the plant of the Truckee River General Electric Co.
is secured from artesian wells in Smith Valley, brought to the
mine by pipe line.
properties have 33 buildings, including a 11x16' machine shop, 11x18'
16' carpenter shop, all of wood, also a compressor house, office, lab
dwellings.
nearest railway station is at Wabuska, 20 miles northward, on the
Mine Railway, and the company plans organizing a subsidiary co
to build a branch railway line. A wagon road has been built from
mine on the Southern Pacific Railway 6 miles west of Wabuska,
station is by fleet traction engine.
many claims milling ore to Nixon smelter, which apparently is a mo
to the amount of ore blocked out might seem to warrant
from concentrator and 250-ton smelter, would, in the end, prob
a profit, though requiring a much larger tonnage.
report of Mr. E. P. Jennings, 1907, [illegible] that the blocks ore/
[illegible] averaging 3.7 [illegible] containing $47,000
[illegible] not for a [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible]

pur. Lands, 50 claims, area 995 acres. Company's "conservative" figu claimed millions of tons of ore in sight, with at least 1,000,000 tons of ore the Home Bee mine, said to assay 6 to 31% copper, but the information ma have been obtained by a clairvoyant, as developments do not show the ex Apparently merely a bit of stock-jobbery, and presumably idle.

NEVADA GREENWATER MINING CO. CALIFORNIA

Mine office: Greenwater, Inyo Co., Cal., Geo. Jones, superintendent. Nevada Greenwater Mining Co. was organized November, 1906, under laws o Arizona, with capitalization $2,000,000, by Marius Duvall, Jas. Gleason an T. W. Kendall, and a Nevada Greenwater Mining Co. was organized circa No vember, 1906, under laws of Arizona, with capitalization $3,000,000, by A. J. Daggs and L. Morgan Darby. Lands, in Willow Creek section of the Green water district, are said to show a 16′ vein of 16% ore, which is not true.

NEVADA GREENWATER MINING, MILLING & SMELTING CO. CALIFORNIA & NEVADA

Office: 1118-67 Exchange Place, New York, N. Y. Mine office: Green water, Inyo Co., Cal. Wallace H. Hopkins, president; T. H. McInnerney, vice-president; Thos. J. Delahunt, secretary; Maj. L. H. French, managing director. Capitalization $5,000,000, shares $5 par.

Lands, 15 claims, at Greenwater, 5 at Lida, 2 at Tonopah and 2 at Gold field, with sundry alleged Goldfield leases. The president became an embezzler and fugitive from justice, and the company is considered merely a bit of stock jobbery.

NEVADA NICKEL & COPPER CO. NEVADA

Mine office: Bunkerville, Lincoln Co., Nev. Property is the Key West group, said to have about one mile of workings, left by a former owner, said to give average assays of 5 to 6% copper, 2% nickel and 0.3 to 0.5 oz. platinum per ton. Presumably idle.

NEVADA NORTHERN COPPER CO. NEVADA

Dead. Was reorganized, circa December, 1906, as Ely Northern Copper Co. Formerly at Ely, White Pine Co., Nev.

NEVADA NORTHERN COPPER MINING & MILLING CO. NEVADA

Office: 51 Sherman St., Deadwood, S. D. Mine office: Winnemucca, Humboldt Co., Nev. Dr. Jas. A. Ogden, president; C. H. Miller, vice-president; G. S. Harper, secretary; S. T. Arnold, treasurer; J. C. Fuller, general manager; F. W. Barbee, mine superintendent. Organized May, 1907, under laws of South Dakota, with capitalization $1,500,000, shares $1 par; issued, $115,000.

Lands, 17 claims, unpatented, area 340 acres, also a 20-acre millsite, in the Sonora range, 12 miles southeast of Winnemucca, showing 8 contact deposits, of which 4, under development, are reported as of 18′ average width, traceable circa one mile, carrying native copper, oxides, bornite and chalcopyrite, with slate gangue, estimated by company to average 15% copper, 5 oz. silver and $1.50 gold per ton, which figures are excessive. Development is by 10′ and 20′ pits, a 50′ shaft and a 330′ tunnel. Company plans continuous development.

NEVADA-PHOENIX MINING CO. NEVADA

Mine office: Beowawe, Eureka Co., Nev. P. V. Locker, manager. Lands, 22 claims, south of Beowawe, having a shallow 2-compartment shaft and a 200′ crosscut tunnel, showing a 3′ vein said to give average assays of 7.2% copper, 55 oz. silver and $16 gold per ton.

NEVADA QUEEN COPPER CO. NEVADA

Office: care of D. Chisholm, Colorado Springs, Colo. Organized 1906, under laws of Colorado, with capitalization $1,500,000. Presumably is successor to the Nevada Queen Mining Co. Location of lands, if any, unknown.

VADA QUEEN MINING CO. **NEVADA.**

Office: care of J. K. Miller, P. O. Box 1202, Colorado Springs, Colo. Never ive and presumably succeeded, 1906, by Nevada Queen Copper Co.

VADA SMELTING & MINES CORPORATION. **CALIFORNIA.**

Office: 25 Broad St., New York, N. Y. Mine office: Greenwater, Inyo Co., . Malcolm L. Macdonald, president; M. R. Ward, vice-president; Arthur Joseph, treasurer; H. L. Fridenberg, secretary; Chas. Kirchen, general nager. Organized June, 1906, under laws of South Dakota, with capitaliza- n $5,000,000, shares $5 par. Lands include copper claims at Greenwater and ld claims at Kawich, Reveille and elsewhere in Nevada. Idle at last ac- nts.

EVADA UNITED MINING CO. **NEVADA.**

Office: 51 Wall St., New York, N. Y. Mine office: Lovelock, Humboldt ., Nev. Oliver G. Jennings, president and treasurer; Louis J. Merkel, vice- esident; David R. Foster, secretary; John T. Reed, general manager; pre- ding officers, Geo. Lowther and John G. Gillig, directors. Organized May 1, 06, under laws of Arizona, with capitalization $200,000, shares $1 par; is- ed, $145,000.

Lands, 33 claims, partly patented, area circa 500 acres, also a 68-acre mill- te, in the White Cloud district of Churchill county, Nevada, showing mainly nestone, with 2 ore zones, having gossans of cupriferous hematite, carrying idized ores in the gossan, and sulphides at depth.

Development is by shafts of 40′, 60′, 70′ and 120′, and by 5 tunnels, longest 000′, with circa 4,000′ of workings, estimated to show 10,000 tons of ore, with 000 tons blocked out for stoping. Property was worked, 1871-1873, and again 90-1895, and was reopened, 1906, by present management.

Equipment includes a 160-h. p. steam plant, with hoist good for 750′ depth, d a 4-drill Ingersoll-Rand air-compressor. There are 10 mine buildings, and antiquated smelter having a 30-ton Fraser & Chalmers water-jacket blast- rnace, of no present value. Company plans continuing exploratory work, d adding new equipment as development will justify.

EVADA-UTAH MINES & SMELTERS CORPORATION. **NEVADA & UTAH.**

Office: 100 Broadway, New York, N. Y. Mine offices: Pioche, Lincoln ., Nev., Cactus, Beaver Co., Utah, and Bingham Canyon, Salt Lake Co., Utah. o. E. Learnard, president; Dr. L. R. Loomis, vice-president and manager; ederick F. Burgin, treasurer; preceding officers, John W. Griffs and Heman wd, directors; Millard W. Baldwin, clerk; Morris D. Kirk, superintendent ngham property. Organized 1904, under laws of Maine, with capitalization 500,000, increased later to $15,000,000, shares $10 par. On June 10, 1907, mpany took over the Imperial Gold & Copper Mining Co., of Beaver county, vada, and the Manhattan Copper & Gold Mining Co. and Pioche Consoli- ed Mining Co., two latter of Pioche, the Pioche Consolidated having been ght at a price said to be $425,000, less 7.5% cash discount. Debentures, 000,000, in registered 5-year 6% gold bonds, due Sept. 1, 1909, convertible, option of holders, into common stock, at par. Is said to have circa 12,000 reholders.

Landed holdings are extensive and valuable, but definite statements re- ding same have not been secured, despite repeated efforts. The company e held options on various properties, including the Montreal, in Beaver nty, Utah, which apparently were not exercised.

Landed holdings include property formerly held by the Pioche Consoli- ed, which had 38 claims, of which 33 were patented, also 51 town lots and 28 acres miscellaneous lands.

The Pioche *mine, which was a good silver-lead* property, circa 1870-1876,

and which was closed down 1893, is popularly credited with a past production of $20,000,000 in gross value. The May Day mine of this property has a 1,100' shaft, and there are 2 old shafts on the Yuba mine, an adjoining property, also the 400' Meadow Valley No. 5 three-compartment incline shaft. The old Independence shaft is said to show a 40' body of sulphide ore between the third and fourth levels. There is a 700' Leschen aërial tram from the May Day shaft to the ore-bins on the company's private railway, running from the mine to Pioche. The Pioche has a good mining equipment.

The Half Moon group of 6 claims, area 42 acres, lies circa one and one-half miles west of Pioche.

The Manhattan mine, in the Pioche district, is supposed to be owned by this company, but apparently is idle.

Company's holdings in the Jack Rabbit district, 15 miles west of Pioche, are 5 patented claims, area 115 acres, including the Day and Onondaga mines. The Day mine has a tunnel, completed late 1908, with a back of 1,300', showing ore said to assay up to 2.5% copper, 217 oz. silver and 0.06% gold.

The Imperial group, which includes the Comet mine, area 400 acres, lies near the Horn Silver, Cactus and Majestic mines, in Beaver county, Utah. The Imperial group, developed by tunnels, has carbonate ores above and sulphides at little depth, ore being claimed to average circa 3% copper, 15% lead, 18 oz. silver and $9 gold. Ore is mainly of concentrating grade, but considerable ore has been shipped to smelters, from time to time. The Comet mine, a single claim, adjoining the Cactus, undoubtedly carries a continuation of the Cactus ore bodies of the Newhouse Mines & Smelters. The Comet has a single shaft of circa 300' depth, in a gossan carrying about 1% copper, and company planned beginning crosscutting on the 300' level. The former management figured on 3.5% copper ore in the Comet, which carries ore mainly of concentrating grade, with values in copper, silver and gold. The adjoining Cactus mine is opened by a 6,000' tunnel, and the development of the Comet would necessitate an even longer tunnel, or an extensive aërial tram.

The Last Chance mine, 13 claims, area 115 acres, formerly owned by the New England-Utah Mining Co., lies between the Highland Boy and United States, southwest of the Boston Consolidated, in the West Mountain district of Utah, and shows fissure veins and contact deposits of 3' to 50' width, carrying fair values in copper, lead, silver and gold, with values mainly in silver and lead. The principal ore body is said to have produced circa $1,250,000 in ore values. Development is by tunnels of circa 7,000' aggregate length, with about 2 miles of workings.

The Last Chance has a mill of 125 tons rated daily capacity, in commission February, 1907, which, a few months later, was producing about 5 tons daily of concentrates averaging circa 10% lead and 70 oz. silver per ton. The mill was closed October, 1907. The Last Chance is well located, and is considered promising.

The Jack Rabbit group is connected with Pioche by a 20-mile narrow gauge railway, and Pioche is connected with the San Pedro Railway by a 28-mile branch line, known as the Caliente & Pioche, completed 1907, toward the construction of which the company is said to have advanced $80,000, to apply on first freights.

There is an old smelter, with 2 small furnaces, about a mile from Pioche, owned by the company, but this is antiquated in design and equipment, and of small present value. It was claimed, July, 1907, that the Nevada-Utah might buy the reduction plant of the Consolidated Arizona Smelting Co., at Humboldt, Arizona, but it is difficult to see how a smelter in Yavapai county, *Arizona, could* be of any particular value to the mines of this company in *Utah and* Nevada.

anding of the company has been greatly injured by its connection otorious Thos. W. Lawson, who concocted a very clever scheme, in with the rigging of the stock market, in March, 1907. On Feb. 28, son advertised, at heavy cost, that he was planning taking up ab, and, by clever manipulation, strung along the speculators for , but, on March 13, announced that he was through with the prop- was not as represented, following this statement with another that f, would double the market price, or thereabouts, to help out the s, and, of course, unloaded his holdings. The stock was sold mainly awkers, newsboys, bar porters, scrubwomen and other unfortunates caliber, who comprise the bulk of Lawson's following. These, as a wiped out completely, and the profits accruing doubtless went to us Lawson. The company states that Lawson took an option on a nt of its stock, and allowed the option to lapse, this being the com- rsion of its connection with this malodorous campaign.

rently it was predicted by President Learnard that at the end of 1908 nine would be producing daily 250 tons of silver-lead ore, netting the $45,000 per month. Apparently only the Day mine is being worked at Forces were greatly reduced, October, 1907, owing to the slump in market. The property includes several mines of promise, but, on f Lawson's connection, the company necessarily rests under a cloud, nds of prudent investors.

VERDE COPPER CO. **NEVADA.**

: Goldfield, Nev. Mine office: Yerington, Lyon Co., Nev. Organ- 24, 1906, under laws of Arizona, with capitalization $1,000,000, shares . G. Sieneke, president; W. D. Boulter, vice-president; C. Barnes, sec- d treasurer; preceding officers, L. L. Bradford and Chas. Patrick, Lands, 25 claims, area 500 acres, near Yerington, with about one- le of openings, showing copper carbonates and sulphides.

VULCAN MINES CO. **NEVADA.**

Was successor of the Vulcan Consolidated Copper Co. Formerly at Esmeralda Co., Nev.

WEAT MINE. **MONTANA.**

d by Anaconda Copper Mining Co.

DRUCE & CO. **WALES.**

: 4 Corbet Court, Gracechurch St., London, E. C., Eng. Works lanelly, Caermarthenshire, Wales. Property is the Llanelly copper ilt 1805.

ERICAN MINING & MILLING CO. **UTAH.**

Formerly at Brigham, Box Elder Co., Utah.

NIVERSARY MINE. **AUSTRALIA.**

office: Herberton, Queensland, Australia. Ore is shipped to Chil- lter, and production, 1907, was 550 long tons of ore, yielding 208,320 opper and 5,600 oz. silver.

IO COPPER & EXPLORATION CO., LTD. **MEXICO.**

Dissolved, May 7, 1907. Formerly at Ario de Rosales, Ario, Mich- x. Described Vol. VI.

LLA BALLA COPPER MINES, LTD. **AUSTRALIA.**

: 6 Great St. Helen's, London, E. C., Eng. Mine office: Port Balla stern Australia. Theophilus W. Williams, J. P., chairman; Ernest A. eretary; W. H. Mitchell, legal manager in Western Australia. Or- pr. 16, 1901, under laws of Great Britain, as a reconstruction of the la Copper Mines, Ltd., with capitalization £250,000, shares £1 par; 38,599. Lands, 130 acres, in 2 groups, known as the Balla Balla and ri *groups, in the Pilbarra district,* 14 miles from Port Balla Balla.

Has a 30-ton smelter, and a smelting test, 1905, is said to have giv
tory results. Receiver appointed and company being liquidated.

NEW BINGHAM CONSOLIDATED MINING CO.

Office: care of Jesse Knight, president, Provo, Utah. Mine o
ham Canyon, Salt Lake Co., Utah. Wm. W. Mathews, vice-pr
Lester Mangum, secretary and treasurer; preceding officers, Wm.
son and J. Wm. Knight, directors. Organized circa January, 1907,
of Utah, with capitalization $100,000, shares $1 par. Lands, 6 cl
northern part of the Bingham district.

NEW BOSTON MINING CO.

Office: Eden Valley, Minn. Mine office: Corbin, Jefferson
Jas. Davidson, president; Hugo Traylor, secretary and treasurer.
tion $600,000, shares $1 par. Lands, 8 claims, 2 fractional, adjoinin
& Corbin, said to carry upwards of 20 different veins, including
claim, showing a 5′ vein with a 16″ paystreak assaying 10.5% co
silver and $3 gold per ton, balance of vein assaying about 3% co
pany's fiscal agent advertised that it would make its shareholde
and that its stock is "fully guaranteed by 10-year gold bonds,
interest—50 per cent. commission to agents—why not become a mi
Property considered somewhat promising, but company not regarde

NEWBURY MINING CO.

Mine office: Florence, Pinal Co., Ariz. W. V. Lander, vi
C. M. Schofield, superintendent. Organized circa 1901, with c
$2,000,000, shares $10 par. Lands, 49 acres, and a smelter-site
River. Company also is said to have 22 claims in the Pioneer di
Superstition Mountains. Mine has a 300′ tunnel, and 4 shafts of
depth, and is said to have several miles of workings, with reserv
at 175,000 tons of ore, said to average about 4% copper and $6
Property formerly was a silver mine, having 4 practically parall
values changed to copper at depth. Has steam and electric power
air-compressor, and plans an aërial tram from mines to railway.
sidered promising, though some advertising by the fiscal agents, F.
& Co., was decidedly raw. Employs circa 30 men.

NEW CALEDONIA COPPER CO., LTD. **NEW C**

Dead. Reorganized, 1899, as Caledonia Copper Co., Ltd.
Noumea, Diahot district, New Caledonia.

NEW CENTURY COPPER MINING CO

Office: Enid, Okla. Mine office: Battle, Carbon Co., Wyo.
superintendent. Organized 1907. Lands are the Century group,
Verde mine, in the Battle Lake district.

NEW CENTURY EXPLORATION & INVESTMENT CO. **IDAHO, OREGON & WA**

Office: 500-125 La Salle St., Chicago, Ills. Mine office: Dar
homish Co., Wash. J. W. McCoy, president; J. C. Morehouse, vi
Joseph G. English, treasurer; H. A. Burdick, secretary; T. T. Wat
secretary; N. L. Franke, mine manager. Organized November,
laws of Arizona, with capitalization $7,500,000, shares $10 par.
claims, area circa 900 acres, including claims near Atlanta, Elmor
claims near Baker City, Baker Co., Oregon, and the Forrest-Chic
on Gold Mountain, near Darrington, area circa 400 acres, which i
company to have 700,000 tons of auriferous and argentiferous copp
$10 per ton, blocked out, which claim is regarded as preposterous.
250-ton reduction plant did not materialize. Regarded with susp

NEW CHICAGO MINING CO.

Mine office: Murray, Shoshone Co., Idaho. Geo. H. Hell

NEW ENGLAND-ARIZONA COPPER CO.

Dead. Merged, 1907, in Verde River Copper Co. Formerly Yavapai Co., Ariz.

NEW ENGLAND-ARIZONA COPPER-GOLD MINING CO.

Office: care of J. W. Stonehouse, Douglas, Ariz. Mine offices: Cochise Co., Ariz., and Dudleyville, Pinal Co., Ariz. Organized 190 italization $3,000,000. Idle.

NEW ENGLAND & ARIZONA GOLD & COPPER CO.

Office: 69 Pearl St., Boston, Mass. Mine office: McCabe, Ariz. Geo. A. Whitney, president; Frank Harlow, vice-president; low, secretary and treasurer; preceding officers, J. J. Bernie, W. A. H. Smith, A. M. Ireland, F. J. Rolfe, Fred C. Bidwell and E. P rectors; John H. Farrell, general superintendent. Organized Jan. der laws of Arizona, with capitalization $750,000, shares $1 par claims, area 120 acres, including the Red Star group of 3 claims a met group of 2 claims, circa 4 miles north of McCabe and about 2 the Humboldt smelter. Mine, opened by a number of short tunn a 325′ two-compartment main shaft, has 2 practically parallel vein apart, carrying paystreaks up to 2′ in width, of about 10% ave tenor. Has steam power and several mine buildings.

NEW ENGLAND & CLIFTON COPPER CO.

Office: 43 State St., Boston, Mass. Mine office: Clifton, Ariz. E. Rollins Morse, president; Edmund Bristol, vice-presiden aging director; Alex. Veitch, general manager; C. E. Phippen, se treasurer; Horace Moses, superintendent. Organized 1903, und Maine, with capitalization $5,000,000, shares $5 par, in $2,000,000 p stock, cumulative after payment of 8% dividends, and $3,000,(stock. Issued, $1,373,745 preferred and $2,722,750 common shar September, 1908, for sale, $100,000 first-mortgage 7% bonds, runn to raise funds for building a 100-ton concentrator. Company w of the New England Copper Co. and Clifton Consolidated Mines Annual meeting, second Monday in August.

Lands, 78 claims, area 1,006 acres, lying mainly near the Sh 5 miles northwest of Clifton, on the north side of the San Fra The property includes the Clifton, New England, Antietam and mines, with principal developments of value mainly on the New E principal group shows a main vein, occurring as a fissure in grani 5′ average width, said to show an extreme width of 150′, with an to 400′ in length, carrying highly silicious sulphide ores, mainly with some chalcocite and occasional oxides and carbonates, all si erous and argentiferous, said to average about 12% copper to de 350′, the ore chute declining rapidly in grade below depth of 350′ silicious sulphides of about 2.5% average copper tenor on the The main group is opened by shafts and tunnels, connecting at de 750′. The Clifton has 7 shafts, of 70′ to 315′ depth, and tunnels 700′, 800′, 1,000′ and 1,700′. The New England is opened by shafts 400′, and by a 2,000′ tunnel, the principal vein of the latter bein average width, carrying high grade cuprite, chalcocite and chalco various mines of the company show a considerable amount of ore grade from very rich to very poor.

The Antietam mine, area 3 claims, has a 140′ two-compart showing an ore body of 15′ to 35′ width, carrying chalcocite and giving assays of 4 to 10% copper, up to 7 oz. silver and $2 gold *is said to* have about 40,000 tons of ore in sight. There is a tr *the Antietam* to the Shannon railway. The property has ore bun

les below the mine, connected therewith by wagon road, and connecting by -mile ground-tram, of 20" gauge, with the Arizona Railroad.

The Copper King mine, which apparently is but slightly developed, is said have about 40,000 tons of ore in sight, which estimate perhaps is high.

Equipment includes steam, gasoline and electric power, and there are a nber of mine buildings.

Production has been as follows: 1,140,770 lbs. fine copper, 10,472 oz. er and 43 oz. gold in 1906; 1,981,189 lbs. fine copper, 19,578 oz. silver and oz. gold in 1907. The property has shipped considerable ore averaging ter than 10% in copper tenor, and, until the break in the metal market, , was shipping circa 1,000 tons monthly. Work was resumed March, 1908. nagement considered good and property promising.

W ENGLAND-COLORADO COPPER MINES CO. **COLORADO.**

Dead. Formerly in Chaffee and Frémont counties, Colorado.

V ENGLAND COPPER CO. **ARIZONA.**

Dead. Succeeded, circa 1904, by New England & Clifton Copper Co. erly at Clifton, Graham Co., Ariz.

ENGLAND COPPER CO. **MICHIGAN.**

Dead. Wound up, 1907, by Jeremiah T. Finnegan, receiver. Formerly d circa 500 acres of land, in Town 58 N., Range 27 W., about 2 miles from nd of Keweenaw Point, Keweenaw county, Michigan.

ENGLAND GOLD & COPPER MINING CO. **UTAH.**

ffice: 67 Milk St., Boston, Mass. Mine office: Bingham Canyon, Salt Co., Utah. Employs circa 40 men. Daniel W. Williams, president; E. E. rombie, vice-president and managing director; Geo. F. Bradstreet, secre- nd treasurer; preceding officers, Jas. S. Williams, Geo. Bancroft, Wood- Ierxa and Thos. Kellough, directors; David J. Cook, superintendent. Or- d June, 1899, under laws of Colorado, with capitalization $2,000,000, $10 par; issued, $1,201,130. Bonds, $500,000 authorized, at 6%; issued, 00. Federal Trust Co., Boston, registrar; Geo. F. Bradstreet & Co., trans- ents. Annual meeting, first Monday in June.

nds, 13 claims, 9 patented, area circa 115 acres, including a group of tional claims, area circa 18 acres, in the West Mountain or Bingham t, and sundry claims near Goldfield, Esmeralda Co., Nev.

ie Bingham group shows porphyritic country rock, carrying 3 principal veins, of 30" average width, 1,000' average length and known depth ', opened by the 1,600' Nast tunnel, and the 1,670' Benton tunnel, both and a 159' shaft, with a total of circa 5,600' of workings. Apparently ins are growing wider at depth. Ores are said to give average assays % lead, 10% zinc, 15 oz. silver and $4.50 gold per ton, with small and le values in copper, in addition to which the monzonite country rock small copper values, and perhaps may prove workable, in parts, at ater date.

quipment includes a steam plant, with a 30-h. p. hoist good for 800'

e concentrator, of 50 tons rated daily capacity, uses electric power, from a commercial company. Equipment includes a 4x12" Sturtevant , 2 rolls, 2 double Hartz jigs and 1 Wilfley table.

oduction, 1907, was 2,108 tons of lead concentrates and 165 tons of cop- . Property closed down, late 1907, on account of low metal prices.

NGLAND MINING CO. **MASSACHUSETTS.**

ce: 35 School St., Greenfield, Mass. Mine office: Charlemont, Frank- Mass. Othello A. Fay, president; Capt. Geo. H. Davenport, treasurer eral manager. Organized 1902, with capitalization $500,000, shares $5 nds, circa *1,000 acres, 2 miles west* of the Davis pyrite mine. Vein,

traced 700', is approximately vertical, conforming closely in dip and with the Savoy schist in which it occurs, and apparently is a fahlband, b well-defined walls, ore occurring scattered through 15' to 20' of the schist a 6" to 12" vein of quartz, well mineralized, on the south wall, and a impregnation of chalcopyrite, 1' to 2' wide, on the north wall. Has partly stripped, and vein trenched across. Idle several years.

NEW ENGLAND-UTAH MINING CO. U

Mine office. Bingham Canyon, Salt Lake Co., Utah. Is controll Nevada-Utah Mines & Smelters Corporation.

NEW ERA MINING CO. ME

Mine office: La Cananea, Arizpe, Sonora, Mex. Lands are south Cananea. Idle since circa 1903 and presumably moribund.

NEWFOUNDLAND COPPER CO., LTD. NEWFOUNDI

Dead. Absorbed, 1901, by Carmen Copper Mines, Ltd. Formerly at Pont, Newfoundland. Described Vol. III.

B. NEWGASS & CO. S

'Office: 7 Lothbury, London, E. C., Eng. Mine office: Changoa, Navarra, Lands, at Arrieta and Changoa, include the Ollin, Arrieta and Changoa carrying silver, lead and copper ores. Idle some years.

NEW HIGHLAND GOLD & COPPER MINING CO. CALIFO

Letter returned unclaimed from former office, 1209 Broadway, O Cal. Mine office: Georgetown, El Dorado Co., Cal. Thos. F. Graber president; C. L. Colvin, secretary and treasurer. Organized Sept. 11 under laws of California, with capitalization $2,000,000, shares $1 par. 11 copper claims and 9 gold claims, area 355 acres, on the mother lode, Georgetown district, showing a fissure vein in slate, giving assays o copper, 15 oz. silver and $2.50 gold per ton. Copper property idle severa and company apparently moribund.

NEWHOUSE MINES & SMELTERS.

Office: 512-71 Broadway, New York, N. Y. Operating office: P. 1388, Salt Lake City, Utah. Mine office: Newhouse, Beaver Co., Utah ploys circa 250 men. Samuel Newhouse, president; Jas. W. Hoban, vic dent; John Josten, secretary and treasurer; preceding officers, J. F. A. Alvin Untermeyer and Hon. Heber M. Wells, directors; Lafayette Ha general manager; Lawrence Townsend, assistant manager; Thos. R. Drur superintendent; Harry Kee, mill superintendent; A. C. Dart, engineer.

Organized May 16, 1903, under laws of New York, with capital $6,000,000, shares $10 par. Debentures, $1,500,000 first-mortgage 6% fund gold bonds, due 1913, of which amount it is variously reporte $900,000 and $1,400,000 are outstanding. Colonial Trust Co., New York, t agent; Windsor Trust Co., New York, registrar. Stock is listed on the Stock Exchange and New York Produce Exchange. Annual meeting, Friday in March.

A dividend of 50 cents per share, amounting to $300,000, was paid 31, 1907, and was called the first quarterly, but was not succeeded by quarterlies, owing to there being no profits to divide. The management have known, when declaring this dividend, in July, 1907, that market tions were such that a continuation of quarterly dividends was somethin than doubtful, and apparently the action of the management, in calling quarterly dividend, was for market effect only, hence highly censurabl fiscal year ending June 30, 1908, the property made net earnings of against which was bond interest of $81,000, showing a small actual net the year's operations.

Lands, 13 claims, patented, area 201 acres, in Copper Gulch, 7 mil *Frisco*, carrying about one mile of the strike of the Cactus vein, also

vale placer, area 168 acres, available water rights at Wah Wah Springs, and agricultural and grazing lands, giving total holdings of 7,882 acres.

The Cactus group, formerly operated, in a small way, without success, by several previous owners, shows country rock of monzonite porphyry, and the Cactus mine is essentially a pyritic impregnation, near the limestone contact, the ore being largely mineralized monzonite, carrying some oxidized ores in the upper workings, but at depth mainly chalcopyrite in pyrite, both slightly argentiferous and auriferous, averaging perhaps 30 cents per ton in combined gold and silver values, and being practically without lead and zinc. Previous to 1905 the Cactus ores are said to have averaged about 1% copper only, and the average grade of ore in the mine is very low, though there is some high grade sulphide ore, mainly chalcopyrite, assaying up to 15 to 20% in copper ener. The mine has ore bodies of large size, ranging up to 200′ in width and 00′ in length, and the company reports its main ore body as 175′ wide, 700′ ong and 600′ deep, with a northwesterly strike and vertical dip. Reserves ere estimated, early 1908, at 4,332,023 tons, averaging 2.5% copper, above the 00′ level. There are persistent rumors that the mine shows diminished values depth, and that the high grade ore body is nearing exhaustion.

Development is by two 3-compartment main shafts, of 600′ and 900′ depth, ith levels at 100′ intervals, connected on the 600′ level with a 6,200′ tunnel, hich has a grade of 5%, and is laid with 30-lb. steel rails. There is an elec- ic hoist on the second level. The lower level is reported to be developing atisfactorily, and the mine is said to have a good ore body on the 800′ level, veraging circa 4% copper. Tramming in the tunnel is done by 2 electric ecomotives, each hauling trains of 21 cars. The tunnel is electric-lighted hroughout, and cut several cupriferous veins before reaching the main vein. he mine has about 3 miles of workings, and for fiscal year 1908 made 3,025′ f new openings.

A steam-shovel, used for stripping, is capable of handling about 1,000 ons of material daily, and company plans extracting a large portion of its re by steam-shovel, first blasting with black powder. There was some trouble, 908, from caving, and the management is said to plan winning ore by the aving system.

After reaching the portal of the main tunnel, the electric trains pass over high trestle to an ore-building, where 7 cars at a time are run into a great eel tube, which is partially rotated, and the ore in the cars dumped onto izzlies, oversize going to Blake crushers, that reduce it to lumps of 1″ size nd smaller, fines and crushed ore going to 800-ton storage bins, whence the re is loaded into railroad cars and taken to the mill.

The mine has a 200-h. p. steam plant, with a 150-h. p. hoist good for 600′, nd a 40-drill Ingersoll-Sergeant air-compressor, both hoist and compressor ing operated electrically. Power formerly was furnished the mine from the ntral plant, by compressed air, piped through a line 13,000′ long, this operat- g steam-shovels and hoists, water for steaming purposes not being available the mine.

The mine and mill are connected by the Newhouse, Copper Gulch & Sevier ake Railroad, 2.3 miles in length, of standard gauge, owned by the company, hich connects with the San Pedro & Salt Lake Railroad, equipment including Shay mountain-climbing locomotive and 5 dump-cars.

The mill is 100x400′ in size, in two 500-ton duplicate sections, being de- ned on the unit plan to allow for future expansion. The western section, hich is the concentrator proper, is of structural steel, with corrugated iron les and roof, while the power plant, under the same roof, is of structural el and brick. Equipment includes three 10x24″ Blake crushers, 4 sets of ls, 18 Hartz jigs, 32 Wilfley *tables*, 8 Wilfley slimers, Sherman settling tanks

and classifiers and a 15-ton Whiting traveling crane. Ore is dumped, as ceived, into 1,000-ton steel bins, whence it is drawn out by belt-convey equipped with plunger feed, and transferred to elevators, of which there ar for each section, one for dry and one for wet ore. Some additional machine was installed, 1908, bringing the mill up to its rated capacity of 1,000 t daily. The mill puts about 8 tons into 1, and is said to effect a saving of ci 80% of assay values, making a concentrate carrying 10 to 25% excess of i which commands a premium of about 10 cents per unit.

In connection with the mill is a 40-ton experimental lixiviation pl planned to leach oxidized ores of the Cactus, which average circa 2.5% cop with small gold and silver values. This plant has certain features pate by Mr. D. H. Waterbury.

The power plant includes five 350-h. p. Babcock & Wilcox boilers a Green fuel economizer, the boiler plant having a 165′ self-supporting smokestack of 8′ diameter. The steam plant is held in reserve, machi being actuated by electric energy, brought 50 miles over the lines of the luride Power Co. There are two 500-h. p. Westinghouse-Parsons steel turb making 3,600 revolutions per minute, formerly direct-connected to two 40 generators that furnished all power, except compressed air, used in the and mill.

The property has an antiquated old smelter, put up by a French com that formerly owned the Cactus, but this is of no particular value at pr

Water is brought from 6 large springs, at Wah Wah, 8½ miles from mill, through a line of 12″ and 14″ riveted steel pipe, laid across Preuss v discharging into a cement reservoir of 300,000 gallons capacity, locate high ground above the mill and townsite, the springs having a flow of 1,000 gallons per minute.

Buildings of the company include a 30x50′ brick machine shop, 3 carpenter shop, smithy, bunk-house and boarding-house. There also is a mill and a 3-ton ice plant, the latter being necessary in summer, as the erty is on the edge of the Escalanta desert.

A townsite called Newhouse has been platted near the mill, and the pany owns therein 47 dwellings, a club-house and a brick hotel with ac modations for 150 men. From the profits of the club-house and clubs, suffi money was realized to build a small opera-house, which is much appreci by the company's employes.

Production has been as follows: 5,020,992 lbs. fine copper for 5,670,993 lbs. fine copper, 53,862 oz. silver and 2,272 oz. gold for fiscal ending June 30, 1906; 176,766 tons of ore, of which 10,014 tons was smel ore, and 19,367 tons of concentrates, yielding 7,244,179 lbs. fine copper, 4 oz. silver and 1,721 oz. gold, for fiscal year ending June 30, 1908. The prop was closed down October, and reopened December, 1907, but in March, the mill was being run only one shift daily, and production was about from smelting ore and half from concentrates. The mine and mill have handled with skill and technical ability, and a large tonnage has been tracted and treated with a comparatively small force. The property has ing capacity for an output of 12,000,000 lbs. copper yearly, or upwards.

Samuel Newhouse, president of the company, was quoted January, as stating that company was then producing copper for 6 cents per p including refining and selling. This simply was not the case. Costs were to have been 8 cents per pound for 1907, but apparently these figures d include marketing. Costs are said to be about 40 cents per ton for mi which probably is rather low, though the mill is doing excellent work, a cost. For fiscal year 1908 the management figures copper costs at 7.05 *per pound* or 10.5 cents per pound with freight, refining and smelting ch

but the fiscal year 1908 showed that the entire net profits had been
d by bond interest, leaving a small deficiency. Apparently there has
uch manipulation of this stock in the New York and Boston markets,
ny misleading statements have been put out regarding production, costs
earnings.

ERSEY-ARIZONA MINING CO. **MEXICO.**

e: P. O. Box 750, Bisbee, Ariz. Letter returned unclaimed from
mine office, Fronteras, Arizpe, Sonora, Mex. Property was claimed
the vicinity of the Greene Consolidated, Hidalgo, Picacho and Mocte-
nes, which was physically impossible. Apparently the only certainty
ation is that the property was claimed to be in northern Mexico, and
ly in Sonora. Property supposedly is controlled, through stock owner-
United Mining Co., of New York, F. L. Brinkerhoff, president. The
claimed to have 18,000,000 tons of ore, capable of making a profit
00,000, and these figures tell the story of what it was—or wasn't.

RSEY METAL REFINING WORKS, LTD. **NEW JERSEY.**

ts office: Elizabeth, Union Co., N. J. Is controlled by Mountain
o., Ltd.

NG SOLOMON'S MINES, LTD. **TRANSVAAL.**

: Johannesburg, Transvaal. Capitalization, £5,000. Property is the
ater's Kop No. 152, in the Zeerust district of the Transvaal.

NCOLN COPPER CO. **WYOMING.**

. Was merged, circa 1907, in Rambler Copper & Platinum Co. For-
Holmes, Albany Co., Wyo. Described Vol. VI.

MMOTH MINING & MILLING CO. **UTAH.**

office: Bingham Canyon, Salt Lake Co., Utah. Ores carry gold,
copper. Idle several years and apparently moribund.

SSINA COPPERS, LTD. **TRANSVAAL.**

: National Mutual Bldg., Rissik St., Johannesburg, Transvaal. Or-
1907, under laws of Transvaal, with capitalization £10,000, shares
working capital, £4,000. Property is 192 base metal claims, on the
nt farm Oestenryk No. 1421, in the Zoutpansberg district, Transvaal.

XICO COPPER MINING & SMELTING CO. **NEW MEXICO.**

. Formerly at Lucero, Mora Co., N. M.

XICO DEVELOPMENT CO. **NEW MEXICO.**

office: Fierro, Grant Co., N. M. Idle and apparently moribund.

XICO GOLD & COPPER MINING CO. **NEW MEXICO.**

: 39 Cawker Bldg., Milwaukee, Wis. Mine office: Tres Piedras,
N. M. Wm. H. Devos, president; Geo. R. Hayden, secretary. Organ-
under laws of New Mexico, with capitalization $2,500,000, shares $1
ds, $25,000 authorized, $4,850 issued, at 7%.
s, 11 claims, area 140 acres, in the Bromide district, showing fissure
chist, and contact deposits between schist and granite. Five veins de-
re claimed to average 7′ in width and to carry native copper, car-
nd sulphide ores, assaying 5 to 40% copper, with occasional high
gold. Has a 130′ shaft with 350′ of workings. Has steam power and
k air-compressor. Has a worthless townsite, called Bromide City.
, and facing bankruptcy.

XICO IRON & COPPER CO. **NEW MEXICO.**

: care of Hon. J. Maurice Finn, president and manager, Denver,
ne office: Corona, Lincoln Co., N. M. Lands, in the Red Cloud dis-
e undergoing development, 1907.

XICO VERDE COPPER CO. **NEW MEXICO.**

: *100 First St., Elizabeth, N. J.* Organized, late 1906, under laws

of New Jersey, with capitalization $1,000,000, by Walter A. Smith, Cornelius M. Garrison and Wm. P. Wallace. Location of lands, if any, unknown.

NEW MICHIGAN COPPER MINING CO. WYOMING.

Office and mine: Laramie, Albany Co., Wyo. Idle since circa 1904, and presumably moribund.

NEW MOONTA MINE. AUSTRALIA.

Office and mine: Mount Perry, Queensland, Australia. T. Hanifan, superintendent. Property, 12 miles northeast of Mount Perry, was a small producer, 1906, employing 59 men.

NEW MOUNT HOPE COPPER MINING CO., LTD. AUSTRALIA.

Dead. Succeeded, circa 1906, by Mount Hope Copper Proprietary. Formerly at Mount Hope, Blaxland Co., N. S. W., Australia.

NEW MOUNT HOPE COPPER MINING CO., LTD. AUSTRALIA.

Dead. Formerly at Mount Hope, Blaxland Co., N. S. W., Australia. Described Vol. VI.

NEW ORE KNOB COPPER CO. NORTH CAROLINA.

Dead. Formerly at Jefferson, Ashe Co., N. C.

NEWPORT & ARIZONA COPPER & GOLD MINING CO. ARIZONA.

Dead. Had an office, circa 1900, at 60 State St., Boston, Mass.

NEW RED WING MINING CO. UTAH

Mine office: Bingham Canyon, Salt Lake Co., Utah. Benj. L. Corum, president; A. D. Lee, vice-president; F. M. Orem, secretary and treasurer. Organized circa 1900, with capitalization $500,000, as successor of Red Wing Gold Mining Co. Is said to have a $50,000 bond issue. Is controlled, through ownership of majority of stock, by Utah Development Co., and owns a half interest in the Markham Gulch Milling Co., which has a 200-ton concentrator. Lands, 110 acres, partly patented, with 2 adverses in litigation. Mine has 3 tunnels, No. 3, circa 700′ long, being claimed to show a 15′ vein of milling ore, carrying values mainly in lead and silver. Also has a 5′ vein, carrying a 3′ paystreak, said to assay 23.2% copper, 12% lead, 60 oz. silver and $1 gold per ton.

NEW RIO TINTO COPPER CO., LTD. SPAIN.

Dead. Absorbed, circa 1904, by Caridad Copper Co., Ltd. Formerly at Lozoyuela, Madrid, Spain.

NEW RIVER COPPER CO.

Office: care of F. W. Pratt, Huntsville, Ala. Organized August, 1902, under laws of Delaware, with capitalization $1,000,000. Apparently abortive.

NEWSBOY COPPER MINING CO. WYOMING.

Dead. Formerly at Encampment, Carbon Co., Wyo.

NEWS COPPER MINING CO. ARIZONA.

Mine office: Jerome, Yavapai Co., Ariz. Lands, sundry claims, 1½ miles southeast of Jerome. Shaft was unwatered and retimbered, 1905, after several years' idleness, and property was investigated by F. August Heinze, but not taken by him, failing to prove as represented. Since idle.

NEW SOUTH WALES MINES & SMELTERS, LTD. AUSTRALIA.

Mine office: Blayney, N. S. W., Australia. Organized circa January, 1907, with capitalization £75,000, shares 10s. par. Property is the Blayney mine, known also as the Great Blayney and Annandale, reopened April, 1907, showing a 40′ vein carrying chalcopyrite with andesitic gangue, opened by a 390′ shaft. Has a 50-ton smelter, with 2 small water-jacket blast-furnaces. In 1901 produced 418 long tons of copper, from 18,666 long tons of ore smelted.

NEW STATE COPPER MINING CO. ARIZONA.

Office and mine: Tucson, Pima Co., Ariz. James W. Bogan, president; *Chas. Bent*, vice-president; Lyman W. Wakefield, treasurer; Ralph K. Shelton, *secretary*. Capitalization, $2,000,000, shares $1 par. Lands, 9 claims, in the

a Mountains, 14 miles west of Tucson, showing a prominent gossan, g oxidized ores and a little chalcocite with small gold and silver values, e for fluxing ore, and presumably underlaid by copper ores of better Has a 40′ shaft showing a little chalcopyrite, and a short tunnel, with 0′ of workings. Has shipped about 300 tons of ore. Idle.

TRATAN COPPERS, LTD. **TRANSVAAL.**

ce: P. O. Box 1276, Johannesburg, Transvaal. J. M. Calderwood, . M., consulting engineer. Organized under laws of Transvaal, with ation £11,000, shares £1 par, fully issued. Lands include 96 claims on popo River, and 360 base metal claims on government Farm Stratan , in the Zoutpansberg district of the Transvaal, latter, slightly pros- iving, 1907, average assays of 17.72% copper, with traces of silver

N COPPER CO. **CALIFORNIA.**

e: 420 Montgomery St., San Francisco, Cal. Mine office: Ranlett, Co., Cal. Col. Horace D. Ranlett, president and general manager. l 1887, under laws of California, with capitalization $200,000, shares Lands, 100 acres, patented, showing 3 fissure veins in slate, carrying lphide ores, averaging circa 8% in copper tenor. Mine, opened 1861, s of 200′ and 430′, with about 20,000 tons of ore in sight. Has steam id smelter with an 80-ton water-jacket blast-furnace, also a 100-ton plant, ore being especially adapted to lixiviation. Idle since circa

COPPER MINING CO. **WYOMING.**

. M. B. McKillep was manager. Property, near Elwood, 7 miles ampment, was said to have 12′ vein of copper ore, opened by a 125′ ormerly at Encampment, Carbon Co., Wyo.

, KEATES & BOLTON. **ENGLAND.**

: 13 Charles St., Princess St., Manchester, Eng. Works office: St. ancashire, Eng. Property is copper smelting and refining works.

AH MINING CO. **UTAH.**

: Salt Lake City, Utah. Mine office: Ibapah, Tooele Co., Utah. ffernan, president; W. W. Thompson, vice-president; Geo. A. Udall, James Norman, treasurer; Timothy Manion, manager. Lands are Flying Dutchman mine. Idle.

LVET-PORTLAND MINE, LTD. **BRITISH COLUMBIA.**

: 535 Salisbury House, London, E. C., Eng. Letter returned un- rom former mine office, Rossland, Trail district, B. C. Allan Maclean, F. A. Labouchere, secretary; S. Severin Sörensen, general manager. Nov. 18, 1905, as successor of the Velvet-Portland Mine, Ltd., with tion £10,000, shares £1 par; issued, £5,699. Lands on Sophie Moun- land, carry low-grade auriferous copper ores. Has a 75-ton concen- h three Tremaine two-stamp mills, 2 Overstrom tables, two sets of hydrometric classifiers, and one Jenckes crusher, putting five tons Idle.

SNAES COPPER CO., LTD. **NORWAY.**

: 32 Charles St., Cardiff, Wales. T. J. Masters, chairman; Herbert secretary. Organized Oct. 28, 1905, under laws of Great Britain, talization £10,000, shares £1 par; issued, £9,000. Property is the copper mine, on Karme Island, Norway. Presumably idle.

ST MUTOOROO COPPER MINING CO. **AUSTRALIA.**

: Melbourne, Australia. Mine office: Cockburn, South Australia. 0 acres, leasehold, 12 miles from Cockburn, having a 110′ shaft, sunk for 60′, cutting an 8′ vein carrying 2 to 3% copper ore, after which *follows the dip of the vein, which* is said to be 20′ wide on the 110′

level. Company planned, late 1907, installing a 100-ton reduction pl
apparently failed to do so.

NEW WORLD SMELTING CO. MO

Office: 306 Pacific Blk., Seattle, Wash. Mine office: Gardiner, I
Mont. Dr. G. L. Tanzer, president. Lands are 60 miles from Gard
3½ miles east of Yellowstone National Park. Company contracted
Colorado Iron Works Co. for a 100-ton copper matting furnace. Pr
idle.

NEW YELTA COPPER MINING & SMELTING CO., LTD. AUS

Dead. Mines, sold, 1903, to Paramatta Copper Mines, Ltd. For
Wallaroo, Daly Co., South Australia.

NEW YORK-ARIZONA COPPER CO. A

Letter returned unclaimed from former mine office, Dewey, Yav
Ariz. Lands are the Denver group, in the Black Hills district, 3 mile
Dewey. Has a 400′ shaft. Idle and apparently moribund.

NEW YORK & ARIZONA COPPER MINING & SMELTING CO. A

Office: 261 Broadway, New York, N. Y. Letter returned unclai
former mine office, Globe, Gila Co., Ariz. Lionel Hagenaers, preside
Macqueston, secretary. Organized 1901, with capitalization $3,000,0
agement poor, property fair, company moribund. Idle since circa 190

NEW YORK-ARIZONA GOLD & COPPER CO. A

Office and mine: Morenci, Graham Co., Ariz. A. L. Work, presid
Cleaveland, vice-president; C. E. Tyler, secretary and treasurer;
officers, R. E. Moore, W. C. Crawford and D. M. Causler, directors;
Molder, general manager; J. R. Wester, superintendent. Organized
1907, under laws of Arizona, with capitalization $900,000, shares $1 p

Lands, 30 claims, unpatented, area 600 acres, in the Copper Mou
trict, 4 miles west of Morenci, also a 150-acre millsite. Property
the Buzzard Shadow and adjacent groups, showing quartzite, shale,
and porphyritic rocks, carrying contact ore bodies having a generally
west strike, with vertical dip. Four ore bodies, under developme
from a few inches to 50′ in width, one showing auriferous and arg
sulphides assaying 15% copper, 10 oz. silver and $10 gold per ton.

Development is by 5 shafts, deepest 80′, and by 4 tunnels, of
600′ and 900′ length, with a total of circa 2,500′ of workings, esti
show 100,000 tons of ore. The Lillian tunnel is said to show a 50′
carrying average values of $12 gold per ton, which, in all likeliho
overestimate. The Buzzard Shadow group shows a 2′ to 4′ vein carryi
cerous and argentiferous copper ore. Values, as developed, are mainly

Equipment includes a 19-h. p. gasoline hoist, and 5 mine buildin
pany plans drifting and sinking on the Lillian and Buzzard Shadow
adding an air-compressor, and building a 10-stamp mill and cyani
Development on the principal copper claim has been hampered by
water.

NEW YORK CANADIAN COPPER CO., LTD. O

Dead. Formerly at Kashaboiwe, Rainy River district, Ont.
scribed Vol. IV.

NEW YORK CONSOLIDATED MINING CO. MI

Office: Leopold Bldg., Houghton, Mich. Lands, 720 acres, being
3, 10 and 15, in Town 57 North, Range 32 West, Keweenaw County,
lying just east of the Manhattan. Idle many years.

NEW YORK COPPER MINING & SMELTING CO. A

Office: 46 North Stone Ave., Tucson, Ariz. Mine office: Helva
Co., Ariz. Frank H. Lee, president; Samuel Seinsheimer, vice-presid
Trippel, secretary; Harry A. Drachman, treasurer; Henry Buchma

r. Organized Nov. 4, 1901, under laws of Arizona, with capitalization 0, shares $1 par. Lands, 8 claims, area 110 acres, showing contact de- between limestone and porphyry, opened by 3 shafts, with total depth and 3 tunnels with total length of 475', showing copper carbonates and s giving average assays of about 4% copper.

ORK & ELY CONSOLIDATED COPPER CO. **NEVADA.**

d. Formerly had an office at 1103-66 Broadway, New York, N. Y. at Ely, White Pine Co., Nev.

ORK & GREENWATER COPPER CO. **CALIFORNIA.**

e office: Greenwater, Inyo Co., Cal. Organized October, 1906, under Arizona, with capitalization $1,000,000. Idle.

ORK & INYO COPPER CO. **CALIFORNIA.**

e: 254 Wilcox Bldg., Los Angeles, Cal. Mine office: Citrus, Inyo Co., J. Lang, president; A. G. Lang, vice-president; A. N. Francisco, secre- D. Gordon, treasurer; F. S. Gordon, consulting engineer. Lands, 5 rea 100 acres, circa 6 miles from Citrus, taken over from the Inyo Consolidated Copper Co. Property has a 100' tunnel, showing oxidized ying 2.5 to 17% copper, with combined gold and silver values of $1.50 per ton.

ORK & MEXICO EXPLORATION & ELOPMENT CO. **ARIZONA & MEXICO.**

. Was organized March 1, 1906, under laws of Maine, and name Oct. 31, 1906, to Cananea & Globe Exploration & Development Co. at Globe, Gila Co., Ariz., and La Cananea, Arizpe, Sonora, Mex.

ORK & MONTANA COPPER MINING CO. **MONTANA.**

e: 32 Broadway, New York, N. Y. Mine office: Corbin, Jefferson t. J. H. McCabe, general manager. Organized 1903, under laws of , with capitalization $1,000,000, shares $1 par. Lands, circa 250 acres, the Erickson, Scioto and Copper Gulch groups, opened by 3 two- ent shafts, said to make a good showing of medium-grade ore. Idle ears.

ORK & NEVADA COPPER CO. **NEVADA.**

. Lands sold, 1905, to Nevada Consolidated Copper Co. Fully de- ols. III. and IV.

ORK-NEVADA GOLD-COPPER MINING CO. **NEVADA.**

: 504 Rector Bldg., Chicago, Ills. Mine office: Goldfield, Esmeralda Jas. Rice, president; W. B. McConnell, vice-president and treasurer; ebb, secretary; Harry F. Parker, general manager. Organized August, er laws of Arizona, with capitalization $5,000,000, shares $1 par.

s are said to be 31 claims, including 12 claims 3 miles from Copper- neralda Co., Nev., circa 50 miles northwest of Tonopah, which are ow veins of 7' to 12' width, carrying high grade copper ores; 19 claims northeast of Goldfield, near Red Mountain, and a 5-acre millsite near ev. The company claims to have one mile of workings, with 20,000 re blocked out, carrying values in copper, lead, silver and gold.

ORK & SALTESE COPPER MINING CO. **MONTANA.**

office: Saltese, Missoula Co., Mont. Organized 1906, with capitali- ,000,000, shares $10 par, as a reconstruction of the National Mining ng Co. Presumably idle.

ORK-SEATTLE COPPER MINING CO. **WASHINGTON.**

: 237 Broadway, New York, N. Y. Mine office: Index, Snohomish h. Harry D. Cowden, president; R. H. Hingston, secretary; Philip treasurer and superintendent. Organized Aug. 17, 1901, with capi- $1,000,000, shares $1 par.

ls, 8 claims, area 160 acres, well timbered and watered, with an avail-

able water-power, 13 miles from the Great Northern railroad, with a go wagon-road thereto, in the Mineral City and Silver Creek districts. Mine h a 212′ shaft and circa 1,250′ of tunnels, showing 4 veins, of 4′ to 20′ avera width, carrying copper ore that gave average returns of $14.42 per ton, i mill tests.

Equipment includes a hydraulic power installation, air-compressor an sawmill. Has a 100-ton concentrator, milling circa 60 tons daily, at la accounts, shipping concentrates to Everett smelter. Management seems vigo ous and efficient.

NEW YORK & UTAH COPPER & GOLD MINING & MILLING CO. UTA

Office: Salt Lake City, Utah. Letter returned unclaimed from forme mine office, Milford, Beaver Co., Utah. J. E. Galigher, president; A. Schneider, vice-president; G. D. B. Turner, secretary and treasurer. Organize July, 1907. Property is the Blue Bird group, formerly owned by Blue Bi Copper-Gold Mining Co., near the Hickory group of the Majestic Mines C having a 275′ shaft.

NEW YORK & VIRGINIA COPPER CO. VIRGINI

Office: 50 Broadway, New York, N. Y. Letter returned unclaimed fr former mine office, Woltz, Carroll Co., Va. Ambrose C. Dunn, president a general manager; Wm. D. Boggs, secretary and treasurer. Organized 19 under laws of West Virginia, with capitalization $2,500,000, shares $1 p Lands, 740 acres, showing 7 cupriferous fissure veins and 2 gold veins, 2 copp veins being developed by shafts of 372′ and 381′ and 2 tunnels of 100′ ea Main vein is claimed by company to average 96′ width, and to show argent erous melaconite, bornite and chalcopyrite, carrying 10% copper, 25 oz. silv and 1 oz. gold per ton, which is an exaggeration. Claims to have about 40,0 tons of smelting ore on the dumps, with a larger amount blocked out f stoping. Idle and presumably moribund.

NEW ZEALAND COPPER ESTATES CO., LTD. NEW ZEALAN

Dead, though not buried at last accounts. Formerly in New Zealand.

NIAGARA COPPER CO. ARIZON

Office and mine: Prescott, Yavapai Co., Ariz. Herman Voge, presid and treasurer; G. H. Schuerman, vice-president; J. P. Bauder, secretary a general manager. Capitalization $1,000,000, shares $1 par.

Lands, 7 claims, area 140 acres, and a 5-acre millsite, in the Copper Cr district, circa 25 miles southwest of Prescott, showing native copper, mel onite, malachite, azurite, chalcocite, bornite and chalcopyrite. Property f merly was claimed to show a vein of 50′ to 150′ width, with footwall t hanging wall paystreaks, giving assays up to 50% copper, 9 oz. silver and $1 gold per ton, opened by shafts of 60′, 60′, and 125′ and by several tunn The property was reported, 1908, by company to have shafts of 40′, 50′ 85′, with tunnels of 50′, 200′, 100′, 400′, 200′ and 260′, with circa 2,000′ workings, showing ore estimated to average 3 to 6% copper, 2 to 7 oz. sil and $1 to $10 gold per ton. The shrinkage in depth of shafts doubtless due to seismological disturbances causing severe contraction of the eart crust in Yavapai county, whereby the shafts were forced upwards and portions thus protruding above the earth's surface were broken off by th own weight. This would seem the most plausible explanation, as none ot has been supplied.

NIAGARA MINING & SMELTING CO. UT

Letter returned unclaimed from former mine office, Bingham Canyon, S Lake Co., Utah. Is controlled, through ownership of majority of stock, *United States* Mining Co., which operates the mine. To all practical inte *and purposes*, is out of business.

COPPER CO. **ALASKA.**

310 American Trust Bldg., Cleveland, Ohio. Mine office: Niblack, ales Island, Alaska. M. P. O'Brien, president and treasurer; Frank , vice-president; S. C. Vessy, secretary; Benedict Crowell, con- neer; Burton B. Nieding, general manager; Wm. N. Fink, engineer.)ct. 12, 1904, under laws of Arizona, with capitalization $250,000. 2 claims, leased from the Geo. M. Wakefield Mineral Land Co., ion over royalties, on the eastern side of the island, having a lake s capable of developing 2,000 h. p. under a 290′ head. Main shaft, levels opened at 50′ intervals. Geology of property is similar to Ketchikan district, on the mainland, showing sedimentary deposits, stone of Devonian or Silurian age, having a general dip to the with intrusions of later eruptive rocks, that have forced their way beds, and altered them to such an extent that identification is he greenstone, in various phases of alteration, carries a mineralized l to the fault planes, with ore-bodies having a general strike of southeast, with dip of circa 60° to southwest. The principal ore ense in greenstone, having a width of 60′, with another ore body level, estimated at 20′ width, and a third lense outcropping on the bove the mine. Ore is chalcopyrite, averaging circa 4% copper, iron, silica and sulphur, with combined gold and silver values of per ton. Property also shows covellite and chalcopyrite, in quartz- sts, at present undeveloped

ent includes a steam hoist, good for 1,000′, and a 6-drill air-com- ildings include a power-house, machine-shop, carpenter-shop, smithy, al store, boarding-house and cabins for miners. Large ore-bunkers, aft, are connected by tramway with a 700′ wharf, tramway and double-tracked, and tram operated by gravity. The wharf is on chorage, a nearly landlocked harbor having deep water, but high sitating a long pier, which is built with pockets, similar to those Superior iron ports. Production, 1905, was 10,209 tons of ore, con- a 850,000 lbs. fine copper.

COPPER DEVELOPMENT CO. **ALASKA.**

Succeeded Oct. 12, 1904, by Niblack Copper Co. Formerly at ince of Wales Island, Alaska.

CHEMICAL CO. **QUEBEC & NEW YORK.**

Succeeded May, 1905, by Nichols Copper Co. Formerly at Capel- oke Co., Que. Fully described Vol. VI.

COPPER CO. **QUEBEC & NEW YORK.**

25 Broad St., New York, N Y. Mine office: Capelton, Sherbrooke . Works office: Laurel Hill, Queens Co., N. Y. Employs about Wm. H. Nichols, president; John B. F. Herreshoff, vice-president; Luther, secretary and general manager; Edw. R. Nichols, treas- ling officers, Wm. H. Nichols, Jr., G. G. Teller and Sanford T. tors; W L. Spofford, mine superintendent. Organized May, 1905, of New York, with capitalization $10,000, shares $100 par, as suc- ichols Chemical Co. Controls, through ownership of majority of an Carlos Copper Co., of Tamaulipas, Mexico.

ert mine, at Capelton, area 640 acres, carries lenses of chalcopyrite the former carrying circa 5% copper and the latter about 38% sul- lopment is by 6 shafts, 4 under 500′ depth each, with one of 800′ 2,000′, with upwards of 5 miles of workings.

ent includes steam power, a 150-ton concentrator, and a smelter. s an acid plant at Capelton, completed, 1907, at a cost of about *ith capacity of about 150 tons of* commercial sulphuric acid daily,

which is one of the most complete in existence. The acid plant burns pyrites, and cupriferous cinder is smelted in a small blast-furnace, producing 1 to 2 tons daily of matte averaging about 40% copper, with small silver contents, which is shipped to the Laurel Hill works for refining, production being circa 350,000 lbs. fine copper yearly.

The company also operates the Davis pyrite mine, at Davis, Franklin Co., Mass., which produces slightly cupriferous pyrites, the principal value being in the sulphur, with copper as a small by-product.

The Laurel Hill works include a smelter and electrolytic refinery, with steam and electric power. Material treated is mainly ores and matte from outside producers in the smelter, and western blister copper in the electrolytic plant.

The Laurel Hill smelter has 10 reverberatory furnaces, taking 40 ton charges, with hearth-linings of quartz sand containing a small quantity of feldspar, each furnace heating a tubular boiler with waste gases. There are two 46x120″ Herreshoff water-jacket blast-furnaces, of 210 tons rated daily capacity each. Matte and slag flow, in an uninterrupted stream, to a large settler, whence slag skims into pots, and matte is tapped into an iron bed. Fuel charges average 14%. Waste gases pass into a 1,000′ main flue, of iron and brick, leading to a 300′ chimney. About 100 tons of flue-dust, recovered monthly, is briquetted and resmelted. The first-fusion product is a matte of 40 to 60% copper tenor, which is resmelted in a water-jacket blast-furnace, with 9% coke charges.

The converter department of the Laurel Hill works has 4 stands, tilted by hydraulic accumulators, with 12 shells, linings for which are made of 85% crushed quartz and 15% clay, ground and mixed in 3 silica-mills with revolving bottoms, linings being tamped by hand, to a thickness of 18″. The linings last from 12 to 16 blows, and the shells vary in capacity, according to the state of linings, from 2 to 6 tons each. The converter blast, at only 8 to 10 lbs. pressure per square inch, is furnished by 100-h. p. and 120-h. p. Connersville blowers. The final converter product is blister copper assaying 99 to 99.5% copper, 50 to 100 oz. silver and 1 to 2 oz. gold per ton. There is a Herreshoff casting table, with 9 moulds, casting anodes. After electrolytic refining cathodes are melted down, in 8 reverberatory furnaces, taking charges of 30 to 45 tons each.

The Laurel Hill electrolytic plant is operated on the series system, with a current of 800 amperes, at 155 volts, generated by 17 dynamos, and the plant has 120 tanks. Anodes are cast ¼x16x59″, with an average weight of 57 lbs., and are smoothed by passing between rolls, after casting. The final product is cast mainly into wire-bars, in moulds painted with a mixture of lampblack and benzine after each casting. This company enjoys a deservedly high reputation for the purity of its product and the efficiency of its metallurgical practice.

JOHN NICHOLSON & SONS, LTD. **ENGLAND.**

Office: Leeds, Eng. Mine office: Hunslet, Yorkshire, Eng. Property is copper reduction works using the wet process for extracting values from cupriferous cinders remaining from the burning of iron pyrites for making sulphuric acid.

NICKEL-COPPER CO. **ONTARIO.**

Office and mine: Worthington, Algoma, Ont. Company experimented with a new process of reducing nickel-copper ores, with the result of failure. Mine idle some years, finances muddled and company apparently hopelessly involved.

NICKEL PLATE MINE. **BRITISH COLUMBIA.**

Owned by Daly Reduction Co.

IGHT HAWK MINING CO. **WASHINGTON.**

Office: 201 Uihlein Bldg., Milwaukee, Wis. Mine office: Loomis, Okanoan Co., Wash. W. E. Stevens, president; A. W. Schroeder, vice-president; . D. James, secretary and general manager; Chas. A. Druse, treasurer; preding officers, P. Meehan and Edward Kolb, directors; Chas. T. Peterson, perintendent. Organized 1901, under laws of Montana, with capitalization 5,000,000, shares $1 par.

Lands, 65 claims, 10 fractional, area circa 1,250 acres, also 150 acres misellaneous lands, including a millsite and townsite, on Mount Ellemeham, in e Wannicut Lake district, east of the Similkameen River. Company bought e Grand View property, at Loomis. Development is by 3 shallow shafts and tunnels, longest circa 1,200'. Property shows numerous fissure veins, of ich 5 have been partly developed, these ranging 6' to 10' in width, carrying timated averages of 8% copper and 1 oz. gold per ton, which estimate unquestionably is excessive.

Equipment includes an electric plant, installed 1908, and a 20-stamp mill, ught, 1908, from the Grand View Mining Co. Property considered promising.

NIKKO COPPER WORKS. **JAPAN.**

Owned by Furukawa Mining Co.

NIKOLAJAV WORKS. **RUSSIA.**

Office and works: Nijni Novgorod, Russia. Property is a copper reduction plant, with an electrolytic refinery of 70 tanks having multiple arrangement of electrodes, with a daily capacity of 1 ton of electrolytic copper.

ILPENA COPPER MINING CO., LTD. **AUSTRALIA.**

Mine office: Blinman, South Australia.

IPISSING COPPER & SILVER CO., LTD. **ONTARIO.**

Office: 609 Temple Bldg., Toronto, Ont. Mine office: Cobalt, Nipissing, t. A. Aubin, president; Duncan Donald, vice-president; F. Asa Hall, secrery; T. Baycroft, mine manager. Organized under laws of Ontario, with pitalization $3,500,000, shares $1 par. Lands, 2,200 acres, said to show a vein of sulphide ore assaying 11% copper and 41 oz. silver per ton. Comny not regarded favorably, on account of the extravagant nature of its adrtising.

IPPER CONSOLIDATED COPPER CO. **MONTANA.**

Office: 42 Broadway, New York, N. Y. F. August Heinze, general manger; Stanley Gifford, secretary and treasurer. Capitalization $3,750,000; nded debt, $2,500,000. Is a subsidiary corporation of the United Copper . Lands sold, 1906, to Butte Coalition Mining Co.

IPPER MINE. **MONTANA.**

Owned by Butte Coalition Mining Co.

ISHINOKAWA MINE. **JAPAN.**

Mine office: Oboki-mura, Nii-gori, Iyo, Japan. Property shows lenses of to 12' thickness, in quartz-schists carrying chalcopyrite associated with halerite, pyrite, magnetite and hematite, with quartz gangue, assaying 3 to % copper. Production was 183,415 lbs. fine copper in 1900; 242,215 lbs. in 903, and 164,645 lbs. in 1907.

IZINA GOLD & COPPER CO., OF ALASKA. **ALASKA.**

Dead. Formerly at McCarthy Creek, Copper River district, Alaska. Deribed Vol. VII.

'KANDHLA SYNDICATE, LTD. **NATAL.**

Office: 1 Great Winchester St., London, E. C., Eng. A. Lee, secretary. rganized March 13, 1902, under laws of Great Britain, with capitalization 2,000, shares £1 par; issued, £1,800. Property was prospecting rights over 4 locks, each 600 yards square, on the Umhlatuzi river, N'kandhla district, ulinland. *Moribund and should be buried.*

NOBLE GOLD MINES, LTD. MONTANA

Dead. Was organized under laws of South Dakota, with capitalization $1,000,000, shares $1 par. Lands were 11 claims, area 320 acres, in the Silver Star district, said to carry gold and copper ores, and company claimed to have a mill. Formerly at Sheridan, Madison Co., Mont.

NOBLE MINING & MILLING CO. MONTANA

Office: 209 Railway Exchange Bldg., St. Louis, Mo. Mine office: Sheridan, Madison Co., Mont. S. M. Kennard, president; J. H. Wyeth, secretary and treasurer; D. H. Noble, general manager. Organized 1887, under laws of Montana, with capitalization $2,000,000, shares $10 par.

Lands, 7 claims, area 75 acres, patented, also a 20-acre millsite, in the Wisconsin district, carrying fissure veins in gneiss, of which two 4′ veins are developed by a 200′ shaft and by tunnels of 16′, 200′, 333′ and 2,150′, showing silicous sulphide ores claimed to average 1.5% copper, 10 oz. silver and $[illegible] gold per ton. Equipment includes a small hoist and a 2-drill Ingersoll-Sergeant air-compressor. Has a small concentrator and a 10-stamp mill. Presumably idle.

NOGALES COPPER CO. ARIZONA & MEXICO

Dead. Reorganized, 1904, as Black Mountain Mining Co. Formerly at Nogales, Santa Cruz Co., Ariz. Described Vol. IV.

NOLANGENI NICKEL & COPPER SYNDICATE, LTD. CAPE COLONY

Mine office: Mount Ayliff, Griqualand, Cape Colony. A. E. Gilson, E. S. Campbell, J. Taylor and Maj. A. Webster, directors; J. P. Johnson, engineer. Capitalization £10,000, vendors taking £200 cash and £7,800 in shares. Lands are 2 areas, bought of E. S. Campbell, showing surface ores assaying up to 0.97% copper and 2.08% nickel. A short tunnel shows chalcopyrite disseminated in pyrite, assaying 7.6% copper and 4.89% nickel.

NOME-MONTANA-NEW MEXICO MINING CO. NEW MEXICO & MONTANA

Office: Iron Blk., Milwaukee, Wis. Mine offices: Tusas, Rio Arriba Co., N. M., and Elliston, Powell Co., Mont. Chas. E. Freet, president; Geo. C. Weiss, secretary. Organized 1902, under laws of Arizona, with capitalization $3,000,000, shares $1 par. Lands include 8,000 acres of placer ground, on creeks near Nome, Alaska, estimated by company to carry an average of $1 gold per cubic yard of gravel, which probably is much too high, also 6 claims adjoining the Copper Cliff mine, near Elliston, and 3 claims in the Bromide district of New Mexico, showing copper and lead sulphides. Is said to have a bucket dredge working in Alaska. Montana and New Mexico properties idle. Is not regarded favorably.

NONESUCH MINE. MICHIGAN

Office: 78 Prospect Ave., Milwaukee, Wis. Mine office: Ontonagon, Ontonagon Co., Mich. A. K. Camp and M. P. O'Brien, owners; Thos. Wilcox, superintendent. Lands, 640 acres. This is the pioneer and principal mine of the Porcupine Mountain district, carrying native copper freely in an argillaceous sandstone-conglomerate. Property was idle for many years, until tested, under option, 1906-1907, through diamond drill borings, by the Calumet & Hecla Mining Co. Very fully described Vol. II.

NONOALCO REFINERY. MEXICO

Owned by Société Affinage des Metaux.

SOCIEDAD FRANCÈSCA DE MINAS y FUNDICION DE NONOGASTA. ARGENTINA

Mine and works office: Nonogasta, Rioja, Argentina. Lands include the Andueza, Atacama, Muerto and San Toribio copper mines, also various silver *mines*, in the Tigre district. Ores of the Andueza are claimed to average *to 20%* copper, 3 oz. silver and 2 oz. gold per ton, which either is an excessiv

ate, or veins are very narrow. Has steam power and a small
1887 to treat dry silver ores, but altered to smelt copper.

PAREIL CONSOLIDATED COPPER CO. WASHI

line office: Index, Snohomish Co., Wash. Dr. S. P. Hehs, p
be Harmon, vice-president; F. G. Mahlman, secretary; R. S. I
rer. Lands, adjoining the Sunset, show 3 veins, slightly develo

PAREIL COPPER MINING CO.

ffice: Wallace, Idaho. Letter returned unclaimed from for
Mullan, Shoshone Co., Idaho. Amos M. Stroud, president an
ger. Lands, 8 claims, patented, across Willow Creek from th
g a tunnel planned to give a back of 700' at length of 1,200'.
have assayed up to 1.5% copper and 8 to 19 oz. silver per ton.

DDEUTSCHE AFFINERIE. GE

ffice and works: Hamburg, Germany. Works have a yearly c
3,000 metric tons of refined copper. Electrolytic plant includes
multiple arrangement of electrodes.

MANBY SYNDICATE, LTD. AU

ffice: 16 O'Connell St., Sydney, N. S. W., Australia. Mine off
, Bowen Co., Queensland, Australia. J. G. Tait, secretary; W.
manager. Lands, 240 acres, freehold, known as the Harpur's
8 miles northwest of Mount Perry, in the Tenningering district
Lady Jane shaft, having 4 levels, was retimbered, the White
own to 3-compartment size and retimbered and the Manning
bered, deepened and given a new hoist, and the tunnel was
Principal production, 1907, was from Virgin No. 1 and Vir
, which yielded good ore. Selected ores, averaging circa 1
0 to 15 dwts. gold per ton, were sent, first to Aldershot smelter
ount Perry, for reduction, and company plans building a sm
rpur's Hill. Property considered promising. Employs circa 12

MANTON-CLONCURRY RAILWAY & AU

OPPER MINES, LTD.

ead. Name changed, 1902, to North Queensland Railway Co.,

SK-BELGISK MINEKOMPANI.

ead. Formerly at Melhus, Flaa sogn, Trondhjem, Norway.

VI.

TH ALICE MINING CO.

ffice and mine: care of John Bielenberg, Butte, Silver Bow C
ized Dec. 8, 1906, under laws of Montana, with capitalizat
\$1 par. Presumably idle.

TH AMERICAN COPPER CO.

ffice: 30 Trust Bldg., Williamsport, Pa. Mine office:
. M. J. W. Christman, president and general manager
s, vice-president; K. E. Jackson, secretary; D. F.
preceding officers, J. W. Villinger, Samuel Stabler,
er, W. Hager and C. A. Barron, directors. Organized
laws of Arizona, as successor of North American
ion \$750,000, increased later to \$1,000,000, shares
l meeting, last Monday in April.
nds, 280 acres, in the Pyramid district, including
Negra groups, showing fissure veins in porphyry
oxides, carbonates and sulphides, giving
er and \$10 gold per ton, said by company
dy being stated, by an observer not
lakes of copper in absolutely unpayable
uipment *includes steam power, with a*

eral mine buildings and 4 dwellings. Company shipped, 1907, to El Paso and Douglas smelters, 98 carloads of ore netting $43,333.36. Company plans moving the Lena concentrator to the Nellie Bly mine, and deepening the shaft 200'.

NORTH AMERICAN COPPER CO. OREGON.

Office: Baker City, Ore. Mine office: Burkemont, Baker Co., Ore. A. B. Spencer, president; W. G. Drawley, vice-president; D. W. C. Nelson, secretary, treasurer and general manager. Organized circa 1907, with capitalization $3,000,000, shares $1 par, as a reconstruction of the North American Mining Co., which was organized, 1905, as a reconstruction of a company organized 1898 under same title. Has authorized a $25,000 bond issue.

Lands, 26 claims, 4 patented, also 440 acres of timber land, circa 25 miles northeast of Baker City, showing a mineralized zone up to 500' in claimed width, opened by numerous pits and trenches, and by a 2-compartment inclined main shaft, circa 300' deep, said to have cut several low grade bodies of copper ore carrying circa $5 per ton in combined silver and gold values. Property shows auriferous and argentiferous ores of copper assaying up to 10% in copper tenor, also a little native copper.

Equipment includes a first-motion hoist and a small air-compressor. The old management lied atrociously in its advertisements, until the reorganization in 1905, but apparently the new officials have no connection with the old management.

NORTH AMERICAN COPPER CO. WYOMING.

Dead. Succeeded by Penn-Wyoming Copper Co. Formerly at Encampment, Carbon Co., Wyo. Fully described Vol. IV.

NORTH AMERICAN EXPLORATION CO. ARIZONA.

Mine office: Gilbert, Yavapai Co., Ariz. Geo. W. Middelton, superintendent. Ores carry gold and copper. Idle some years and apparently moribund.

NORTH AMERICAN EXPLOITATION CO. ARIZONA & MONTANA.

Office: 327 New York Life Bldg., Chicago, Ills. William R. Everett, president; Chas. W. Cheney, vice-president; Davis Ewing, secretary; Western Trust & Guaranty Co., treasurer; Frank F. Day, managing director; Frank A. Summerill, assistant general manager. Capitalization $10,000,000, shares $1 par. Controls, or did control, under lease, the Rambler Mining & Smelting Co., of Wyoming, Mormon Girl Mining Co., of Arizona, Bradshaw Mining Co., of Arizona, and sundry gold mining companies. The North American Exploitation Co. claimed to own 54% of the Rambler stock, 91% of the Bradshaw and 96% of Mormon Girl stock. Company has sold stock on a special repayment contract, alleging that under these terms investments will be repaid in full, with interest, and that the stock is certain to advance immediately upon the installation of smelters. The plan of promotion is a self-evident delusion, as no corporation, even those of the most philanthropic intent, sells stock that is backed by a thoroughly sound guaranty. Stockholders must take their chances, and a guaranteed stock always should be viewed with distrust. Company claimed, in an advertisement, March, 1906, to have 40,000 tons of ore developed, ready for smelting, and to plan installing copper furnaces, of some patent design, at each property, in the near future, notwithstanding which the Mormon Girl property, controlled by this company, was sold for debt, early in 1906, this property bringing the truly magnificent price of $400, cash, at sheriff's sale. The Rambler Mining & Smelting Co. has been reorganized. Company is regarded with deep suspicion as a mere bit of stock-jobbery, or something worse.

NORTH AMERICAN LEAD CO. MISSOURI.

Office: 824 Columbus Savings & Trust Bldg., Columbus, Ohio. Mine office: *Fredericktown*, Madison Co., Mo. Jos. F. Davidson, president; E. A. Cole, vice-

sident; Wm. D. McCullough, secretary; V. Hybinette, assistant general nager; preceding officers and N. Gumble, directors. Employs 400 men. anized 1906, under laws of Ohio, with capitalization $2,000,000, shares $100 , divided into 5,000 shares of 8% preferred and 15,000 shares of common k, of which 3,500 shares preferred and all common stock are issued. Bonds, 0,000 authorized, at 6%; issued, none.

Lands, 2,000 acres, about 2 miles east of Fredericktown, including the old ckeye copper mine, which, circa 1860, was worked in a small way for cop- . Property is a short distance southeast of the celebrated Mine La Motte, untry rock being magnesian limestone, with porphyritic intrusions, carrying ctically horizontal blanket veins, the ore body having a width of about and being traceable about 4 miles, carrying chalcopyrite, linnéite, galena l marcasite, estimated by company to average 5% copper, 4% lead, 2% kel and 1% cobalt.

The predecessor of the present company opened, circa 1901, a new lead e, northeast of the old copper mine, and, in addition to opening one of the st lead mines in southeastern Missouri, also has a very extensive body of per-nickel-cobalt-lead ore: The mine has shafts of 280', 200' and 125', with tal of about 5,000' of workings, and is estimated to show about 1,000,000 s of workable ore.

Equipment is excellent, including a 2,000-h. p. steam plant, 600-kw. electric nt and 350-h. p. air plant, 2 hoists, and Norwalk and Laidlow-Dunn-Gordon compressors of 50 drills combined capacity.

The reduction plant includes a 500-ton lead concentrator and a copper lter, latter, begun July, 1906, and completed late 1907, having been built the plans and under the supervision of Mr. Hybinette, who was general nager of the Orford works for 10 years, and was the inventor of the greater rt of the processes for nickel reduction used at those works, which unques- nably lead in the metallurgy of nickel. Several new processes and modifica- ns of old processes were devised by Mr. Hybinette for the North American nt, which has shaft-furnaces, and a complete electrolytic refinery, for the king of both copper and nickel.

The company has a 2-mile standard-gauge railroad, with one locomotive, nnecting with Iron Mountain railway at Fredericktown.

Production includes varying quantities of lead concentrates, also high de electrolytic copper, electrolytic nickel in cathodes, cobalt oxide and lead centrates, amounting, 1907, to 125,000 lbs. electrolytic copper, 50,000 lbs. ctrolytic nickel and 15,000 lbs. cobalt oxide monthly. Production, 1908, circa 500,000 lbs. fine copper. Property considered valuable and manage- nt good.

RTH AMERICAN MINING CO. **NEW MEXICO.**

Dead. Succeeded, 1906, by North American Copper Co. Formerly at dsburg, Grant Co., N. M. Fully described Vol. VI.

RTH AMERICAN MINING CO. **OREGON.**

Dead. Succeeded, circa 1907, by North American Copper Co. Formerly Burkemont, Baker Co., Ore. Fully described Vol. VI.

RTH AMERICAN PROSPECTING & MINING ASSOCIATION. **COLORADO.**

Office: 405 Temple Court Bldg., Denver, Colo. Mine office: White Pine, nnison Co., Colo. Chris. C. Sierk, president and general manager; Jas. T. se, secretary. Lands, 60 acres, showing 7 contact veins, between limestone d shale, said to give average assays of 2% copper, 25% lead and 20% zinc, m carbonate and sulphide ores. Has water power and a small concentrator, king 55% zinc concentrates and 55% *lead concentrates, carrying copper and* d values, *when working. Idle.*

NORTH ARKANSAS ZINC, LEAD, COPPER, SILVER & GOLD MINING CO. ARIZONA, ARK & CALIFO

Dead. Formerly at Morristown, Maricopa Co., Ariz. Described Vo

NORTH BAY SMELTER. ONT

Owned by North Ontario Reduction & Refining Co., Ltd.

NORTH BISBEE DEVELOPMENT CO. ARI

Office and mine: Bisbee, Cochise Co., Ariz. H. S. Jones, president; Davis, vice-president; Oscar Zapf, secretary; E. H. Clark, superinte Organized Apr. 19, 1906, under laws of Arizona, with capitalization $6 shares $3 par, increased, Apr. 9, 1907, to $999,999, shares $3 par. Lan claims, area 400 acres, in Tombstone Cañon, near the Mountain View De ment Co., circa 4 miles northwest of Bisbee, opened by a shallow shaft 260′ tunnel, showing ore assaying up to 19.7% copper, with small go silver values. Has gasoline power.

NORTH BURRO COPPER MINING CO. NEW ME

Office: Silver City, N. M. Mine office: Leopold, Grant Co., N. M. Sublett, manager. Lands, 14 claims, adjoining the National Copper Co., in Whitewater Cañon, Burro Mountains.

NORTH BUTTE EXTENSION COPPER MINING CO. MONT

Office: 1911-74 Broadway, New York, N. Y. Mine office: Butte, Bow Co., Mont. W. T. Van Brunt, president; Thos. Lavell, vice-pres Fayette Harrington, secretary and treasurer; D. S. Harding, assistant sec and treasurer; G. A. Lauzier, managing director; preceding officers, Ge Lovell, Chas. Passmore and Wm. McDermott, directors; John A. Ryan, intendent. Organized October, 1906, under laws of Arizona, with capi tion $5,000,000, shares $5 par, as North Butte Extension Mining Co., and changed, January, 1907, to present title. Is said to have circa 2,500 holders. In August, 1908, contemplated an issue of $400,000 five-yea bonds, but apparently was unable to place same.

Lands originally were 4 claims and 2 millsites, area 55 acres, lying of the Butte & London and supposed to carry the extension of the Black vein. In March, 1908, the company added the Michigander and Third S claims, on which options were extended, October, 1908. The company al its options on the Occidental and Free Trade claims to lapse, 1908, afte ment of $90,000 on the bonds. Apparently the only property owned ou is the Black Crow fractional claim, of circa 2½ acres area, and the C and Assay millsites.

Development was by a 600′ shaft, planned to have been sunk to 1,000′, proved to be quite wet. A crosscut on the 300′ level showed a small slightly mineralized, and on the 520′ level a plat, cut April, 1908, sho stringer of 2″ to 18″ width, carrying ore assaying up to 20% copper, 3 oz. and 50 cents gold per ton.

The company planned a large electric installation, including a drum hoist, air-compressor and pump, but failed to get it.

A curb pool in the stock of this company was badly nipped, throu dumping of shares held by a bank, as collateral for a loan, hence the p has few friends among the New York curb brokers, who rest under the i sion that they were handed a package, by friends in Butte.

It is alleged that G. A. Lauzier, vendor, made a contract, Jan. 17 with W. T. Van Brunt, the president, giving an option on 700,000 sh 76 2/7 cents per share, and that, by conspiracy, false and fictitious sh the amount of 222,150, were issued from the treasury, with a furthe issue of 100,000 shares, held by Lauzier, and there also is alleged a mi *priation* of $50,000.

The first bankruptcy proceedings begun against the vendors were

he company's favor, but a second series was started. Both Lauzier, the lor, and John A. Ryan, the manager, sued the company.

In October, 1908, sundry interests planned a reorganization, under the s of Maine, with capitalization $1,500,000, shares $1 par, these plans call- for the elimination of the entire former directorate, which is in exceed- y bad odor with investors. The title selected for the proposed reorganiza- n was North Butte Extension Development Co., and the plan of reorganiza- n called for the issue of 1,000,000 shares of stock in the new corporation, exchange for old shares on a parity, plus payment of a 50-cent assessment, 2 installments, the first money to be turned over to the old company for ttlement of its debts, which are pressing. The company owed, late 1907, a ge balance on its bonds on 2 claims, in addition to floating indebtedness timated at $125,000, but, on June 27, 1908, the floating debt, amounting to rca $70,000, was partially met by the sale of notes. The entire proposition s been badly handled, and everybody connected with it comes out with a tirched reputation, while some of the principals can congratulate themselves lucky in having escaped jail.

ORTH BUTTE EXTENSION MINING CO. **MONTANA.**

Dead. Was organized October, 1906, under laws of Arizona, with capital- ation $5,000,000, and title changed, January, 1907, to North Butte Extension pper Mining Co. Formerly at Butte, Silver Bow Co., Mont.

ORTH BUTTE MINING CO. **MONTANA.**

Office: 508 Lyceum Bldg., Duluth, Minn. Mine office: Butte, Silver Bow , Mont. Employs circa 900 men. Capt. Jas. Hoatson, president; Chas. A. ean, vice-president and treasurer; Jos. Cotton, second vice-president and citor; preceding officers, Wm. J. Olcott, John Uno Sebenius, Chester A. gdon, James Gayley, Thomas F. Cole and Daniel M. Clemson, directors; leric R. Kennedy, secretary; Arthur C. Carson, general manager.

Organized Apr. 5, 1905, under laws of Minnesota, with capitalization 00,000, shares $15 par; issued, $6,000,000. American Loan & Trust Co., on, transfer agent; Old Colony Trust Co., Boston, registrar. Shares are d on the Boston Stock Exchange. Has about 5,000 shareholders.

Dividends have been as follows: $1.25 per share in 1905; $7.25 per share 906; $6 per share in 1907; $3 per share in 1908; a total of $17.50 per share, 7,000,000, for four years' operations. Last regular dividend was passed nd of 1907, owing to depression in the metal market. Net earnings, 1907, $2.14 per share. Company ended 1908 earning at the rate of about $7 share per annum. Balance sheet, at end of fiscal year March 31, 1907, actual cost of lands at $7,211,277.

Lands are circa 200 acres, mainly owned outright, but with some small tional interests outstanding, in the case of several properties. The tract compact as could be expected in a district where claims are so irregu- located as in Butte, with small fractions so valuable as is the case. Hold- include the following claims: Speculator, Edith May, Jessie, Adirondack, Emmett, Berlin, Ground Hog, Gustavus, East Gem, West Gem, Copper m, Croesus, Miners' Union, Eva, Emily, Snow Ball, Margaretha, Hancock, hburg and Mill View. Several small fractional interests were exchanged, with the Davis-Daly Estates Copper Co. The Berlin group includes 5 s, and the Ground Hog claim is a small 700′ fraction between the Jessie Hancock. The lands are in the northern part of the proven portion of utte district, near the Anaconda and Boston & Montana mines.

The North Butte is the largest single mine in the camp, and also mines ighest average grade of ore of any Butte mine. The ore is typical of the district, including much high grade chalcocite, frequently massive, but y disseminated, *with considerable quantities* of enargite, and smaller

proportions of other secondary sulphides and chalcopyrite. All ores are m
or less argentiferous, frequently carrying high silver values.

Development is mainly on the Speculator, Jessie and Edith May prop
ties, the lands carrying about one-half mile of the Edith May vein. All o
is raised through the Speculator shaft, and the mines are connected und
ground with the High Ore mine of the Anaconda, and the new Badger Sta
shaft of the Boston & Montana. The old Speculator shaft, taken over in ba
condition, was cut down to 4 compartments, and entirely retimbered, in
weeks, in 1905, during which time ore was hoisted through the High Ore shaf
The Speculator shaft, 1,700′ deep when the property was taken over, 1905,
now 2,240′ deep, with levels opened at 200′ intervals, from the 1,400′ to 2,20
levels inclusive. At the end of 1908 stoping was in progress on the 1,40
1,600′ and 1,800′ levels, with development in progress on the 2,000′ and 2,20
levels. This shaft develops the Speculator, Edith May, Gem and Jessie vein

The veins are treacherous, requiring heavy timbering and close attentio
square sets being employed throughout, with monthly timber requirements
about 1,000,000′, board measure. No waste is hoisted, all ore being sorte
underground, and culls used for dry filling. Cull material is largely low gra
ore, a considerable portion of which probably will be available for smelting
some future date, and can be extracted merely by loading. On Apr. 1, 190
the mine had about 18,000′ of workings, and 6,961′ of new workings were mad
in 1907. The company ended 1907 with 4 years' ore reserves, and at the en
of 1908 had ore reserves of at least 8 years, the openings on the 2,000′ an
2,200′ levels at least doubling the amount of former reserves, with every pro
pect of immense bodies of exceptionally rich ore at greater depth. The fir
ore was hoisted September, 1908, from the 2,200′ level.

The Edith May vein, the principal ore body of the property, as now de
veloped, is 18′ to 42′ in width, carrying phenomenally high grade ores. The
vein is opened at 200′ intervals from the 800′ to the 2,200′ levels, carryin
much chalcocite and bornite, with considerable enargite, the vein increasin
in richness at depth, the north drift on the 1,800′ level of the Edith May ve
being the show stope of Butte, and one of the most phenomenal stopes ev
opened in any copper mine. The Edith May vein divides east of the shaf
and on the 1,600′ and 1,800′ levels shows no commercial ore in the sou
branch, but apparently these branches should unite, some distance west of th
shaft.

The Jessie mine has an old and idle 500′ shaft, extraction being throu
the Speculator, which reaches the Jessie vein by crosscuts. The Jessie sho
a well-mineralized 12′ vein, with a paystreak of high grade chalcocite on th
1,600′ level.

The Gem mine has an old 700′ shaft, now idle, and to all practical purpo
may be considered a portion of the Jessie workings.

The Miners' Union claim, reached on the 1,600′ level through the Spe
lator shaft, via the Edith May vein, shows a fine body of high grade ore.

The Ground Hog mine, reached from the Jessie workings, shows good
on the 1,600′ level.

The Adirondack mine has an old 500′ shaft, and presumably will
opened by crosscuts from the Speculator shaft.

The Berlin mine, to the north of the Speculator, Edith May, Gem
Jessie, has an old 350′ two-compartment shaft, out of commission, and a n
shaft of larger capacity is planned. The Berlin has been opened from
Speculator shaft by crosscuts on the 1,000′ and 1,200′ levels, showing rat
disappointing ore of low average grade, but, late 1908, crosscutting was
progress on 3 levels, from the Speculator shaft, for the Berlin vein, the 1,6

crosscut showing low grade ore. The Berlin, however, should prove to carry higher grade ore with further development.

The Speculator shaft has a 128′ steel gallows-frame, standing on a 41x60′ concrete foundation, having self-dumping skips and pockets with a daily capacity of circa 1,500 tons of ore, as no waste is hoisted, all being used to advantage for underground filling.

The engine-house has a 20-ton traveling crane and a 32x72″ Nordberg duplex-cylinder hoist, operating two cages in counterbalance, with two 8-ton Kimberley skips swung under each, hoisting with 1½″ steel cable, and is capable of raising 2,000 tons daily from an average depth of 2,000′, with capacity to hoist from a depth of 3,500′. An 18x36″ duplex-cylinder hoist operates a double-deck cage in a third compartment, for handling men, material and timber, and the shaft has a fourth compartment for ladder and pipes.

The compressor-house, 24x70′ in size, has a 40-drill air-compressor, with piston efficiency of 3,282 cubic feet of free air per minute reduced to a pressure of 70 lbs. per square inch.

The boiler-house has two batteries of boilers, including boilers of 500 h. p. capacity installed late 1907.

Ore is smelted by the Washoe works of the Anaconda. The original 3-year contract, made 1905, was renewed for 3 years June 1, 1908, the new contract reducing the cost of smelting by about $1 per ton, and providing for settlements on the basis of the average price of copper for the third month after delivery of ore, on the 14th day of the month, which is advantageous on a rising market, but disadvantageous on a falling market. The North Butte contract with the Washoe smelter permits the North Butte to supply the smelter to one-fifth of its capacity, which nominally is 10,000 tons, and actually is nearly or quite 12,000 tons, providing for smelting an output from the North Butte of 2,000 to 2,400 tons daily, which is beyond the present possible productive capacity of the mine, with a single shaft. The Butte Reduction Works treated some ore for the North Butte, when the Washoe works were closed, 1907-1908.

Relations between the North Butte and the Amalgamated Copper Co. are very close and cordial. While this may prove to the disadvantage of the company at such times as the Amalgamated interests see fit to hold the umbrella over the metal market, there can be no question that, on the whole, the North Butte is in better position for being on such friendly terms with its powerful neighbor.

Production for fiscal years ending March 31 has been as follows: 30,954,788 lbs. in 1906; 32,865,907 lbs. in 1907; 16,520,062 lbs. in 1908. For calendar year 1907 the production was circa 37,500,000 lbs. Production was curtailed for the fiscal year ending March 31, 1907, by repairs on the shaft and the installation of a new hoisting plant, and for fiscal year ending March 31, 1908, production was greatly curtailed by suspension of output late in 1907 until early 1908. The company shipped, for last 3 quarters of 1908, circa 1,400 tons daily of ore representing 3,500,000 to 4,000,000 lbs. fine copper monthly.

Gross earnings and net profits, after the deduction of all expenditures for improvements, have been as follows, for fiscal years ending March 31: $5,788 gross earnings, from copper, silver and gold produced, with net profits $2,720,670, in 1906; gross earnings of $6,694,844 and net profits of $3,623,162 in 1907; gross earnings of $2,703,971 and net profits of $857,880 in 1908. Company's ended fiscal year March 31, 1908, with $174,774 cash on hand, with accounts receivable of $10,620, and accounts payable of $74,412.

Returns to the State of Montana, for year ending June 1, 1908, gave a production of 284,003 short tons of ore, with average gross values of $11.36 per ton, with gross proceeds of $3,224,763 and net profit of $1,113,647. Costs were

$3.49 per ton for mining and $3.76 per ton for reduction, with average cost $7.43 per ton. Apparently the gross costs for refining, freight and selling charges are about 2.05 cents per lb. Mining costs, for year ending June 1908, of $3.49, were $1.40 per ton lower than for the preceding year, and mining costs are said to have been reduced to $2.70 per ton, which is a very creditable figure. Costs for July, 1908, were 7.35 cents per lb. of copper, with average extraction of about 6.5%, or about double the average of the Anaconda, and costs were said, October, 1908, to be between 7 and 8 cents per lb. Production includes circa 150,000 oz. silver monthly, with considerable gold values, on a basis of 1,400 tons of ore daily, or nearly $1,000,000 yearly returns from the precious metals.

Apparently the company's ores returned an average of about 5% copper only, for fiscal year ending March 31, 1907, as against 7% in the preceding year, but this apparent decline in values was due to the policy of the company in extracting largely second class ores, during the era of high prices for copper. This policy greatly increased the gross cost per lb., but secured a handsome profit on ores that would net the company nothing during a period of low prices. While this policy is criticized, it seems fundamentally sound as it permits the profitable extraction of much ore that otherwise would be unavailable.

The North Butte is capable of making nearly or quite the cheapest copper produced from any mine in the camp. The company has been criticized for its smelting contract with the Anaconda, but a careful consideration of the facts leads to the conclusion that its contract is advantageous, rather than the reverse, to the North Butte Mining Co. The property is capable, with its present equipment, of producing, at its full capacity, from high grade ores, nearly or quite 60,000,000 lbs. fine copper yearly, but is following a better policy by extracting considerable quantities of medium grade ores in periods of low prices for copper, and large quantities of low grade ores in times of high copper prices. The North Butte is a magnificent property, and is excellently managed.

NORTH BUTTE MOUNTAIN COPPER CO. MONTANA.

Letter returned unclaimed from former office, 803-43 Exchange Place, New York, N. Y., and from former mine office, Butte, Silver Bow Co., Mont. Thos. A. Marlowe, president; Chas. M. Webster, vice-president; J. L. Smith, treasurer; E. L. Mayo, secretary and manager; preceding officers, F. E. Kessler, H. L. Wilson, Thos. Bryant, M. S. Largy, T. B. Miller and H. R. Cunningham, directors; Jas. E. Higgins, superintendent. Organized April, 1906, under laws of Montana, with capitalization $5,000,000, shares $5 par. Lands, 8 claims, area circa 150 acres, lying north of Walkerville and northwest of the Butte & Bacorn, including the J. I. C. group, 8 claims, circa one mile north of the Jessie mine of the North Butte, said to have a good surface showing, with 3 veins, one of which, of 7' estimated width, shows a little copper and silver, at depth of 35'. Lands are said to include 9 distinct veins, with one, of 6' to 8' width, giving surface assays of 0.2 to 1.25% copper, 6 to 14 oz. silver and $4 to $6 gold per ton. Idle at last accounts, but said to have cash on hand, and to plan resumption.

NORTH BUTTE SUMMIT COPPER MINING CO. MONTANA.

Dead. Was organized January, 1907, by residents of Butte. Lands were 7 claims, in the Lost Child district, circa 5 miles northeast of Butte, showing ore giving assays of 1.3% copper. Formerly at Butte, Silver Bow Co., Mont.

NORTH CAROLINA & VIRGINIA DEVELOPMENT CO. NORTH CAROLINA & VIRGINIA.

Dead. Formerly at Virgilina, Halifax Co., Va.

ERRO MURIANO COPPER MINING CO., LTD. **SPAIN.**
: 6 Queen Street Place, London, E. C., Eng. Mine office: Estación
Muriano, Córdoba, Spain. Lord Vaux, chairman; Richard Eshott
lent agent; John Taylor, manager; preceding officers, J. P. Champney
r Taylor, directors; W. H. Rundall, resident agent; H. F. Collins,
rintendent; F. H. Williams, secretary. Organized March 8, 1906,
s of Great Britain, with capitalization £250,000, shares £1 par; issued,
fully paid and £116,000 having 16s. per share paid in. Property
it for £159,500, paid £29,500 cash and £130,000 in shares.
, 155 hectares, adjoining the Cerro Muriano Mines, Ltd., circa 10
a Córdoba, showing extensive traces of ancient workings, presumably
om Roman times. To June 30, 1907, company had made 2,873′ of

ERRO MURIANO COPPER MINING CO., LTD. **SPAIN.**
Was succeeded, March 8, 1906, by North Cerro Muriano Copper Mines,
merly at Cerro Muriano, Córdoba, Spain. Described Vol. VI.

OAST MINING & MILLING CO. **WASHINGTON.**
: 508 Bankers Trust Bldg., Tacoma, Wash. W. W. Shenk, presi-
H. McAllister, vice-president; A. M. Richards, secretary and treas-
ganized Jan. 2, 1908, under laws of Washington, with capitalization
, shares $1 par. Lands, 3 groups, on Thunder Creek, in Whatcom
it counties, Washington, said to carry 2 parallel veins of bornite and
l ore.

OAST MINING & REDUCTION CO. **WASHINGTON.**
: 547 First National Bank Bldg., Chicago, Ills. Mine office: Dar-
Snohomish Co., Wash. J. W. McCoy, president; J. C. Moorehouse,
Glenn M. Deuel, secretary. Organized under laws of Arizona, with
tion $5,000,000. Has authorized a $300,000 bond issue.
s, 300 acres, on Gold Mountain, known as the Chickamun-Forest
imed by company to have upwards of 2,000′ of tunnels, exposing
$7,000,000 worth of ore, which is an overestimate, and to be capable
ing upwards of 5,000 tons of ore daily, which is a ridiculous perversion
uth. Claims to plan a 500-ton mill. Advertisements make propos-
ims, and apparently company is merely a stock-jobbing enterprise.

OPPER CO., LTD. **SWEDEN.**
: 24 Queen Victoria St., London, E. C., Eng. W. Watson Ruther-
P., chairman; Andrew Findlay, secretary. Organized July 4, 1906,
rs of Great Britain, with capitalization £1,000,000, shares £1 par,
rred and half deferred ordinary shares. Lands are 12 copper and
s, area circa 100 acres, and the Inglamala iron mines, in the Province
d, Sweden.

OAST COPPER CO.
: Everett, Wash. Location of lands, if any, unknown.

AST BUTTE COPPER MINING CO. **MONTANA.**
r returned unclaimed from former mine office, Butte, Silver Bow Co.,
rganized Feb. 8, 1906, under laws of Oklahoma, with capitalization
, shares $1 par, by Martin P. Winston and others. Lands are north
of the Butte & Bacorn. Idle.

RN COPPER (B. S. A.) CO., LTD. **RHODESIA.**
: Salisbury House, London, E. C., Eng. Mine office: Bulawayo,
South Africa. Lord Gifford, V. C., chairman; preceding officer, E.
Wilson Fox and P. C. Tarbutt, directors; Bechuanaland Exploration
and name changed June, 1899, to present title, with capitalization
Davey, resident engineer; Tom Donald, secretary. Organized Feb. 16,
r laws of *Great Britain as Northern* Territories (B. S. A.) Exploring

Co., Ltd., and name, changed June, 1899, to present title, with capitalization £250,000, shares £1 par; issued, £178,000. Debentures, £45,900 outstanding, 6%; issued 1903, redeemable at £105, December, 1908, and convertible, when fully paid, into £10 shares, on one month's notice, in writing.

The company large share interests in the Rhodesia Copper Co., Ltd., also in the Kafue and other corporations. Apparently the Bwana M'Kubwa mine formerly owned by this company, has been sold to a subsidiary corporation the Northern & General Syndicate, Ltd. Owing to the interchange of share ownerships between these different companies, it is extremely difficult to arrive at their true status, such vast and loose financing rendering the work of investigation extremely difficult, while the various companies give reports upon the properties in which they are interested, without detailed explanation as whether such properties are owned outright, or are merely interests owned through holding shares in other corporations possessing direct title.

Lands, originally were 500 square miles, near the Zambesi river, also 12,000 acres of coal lands and 220 gold claims in the Umniati and Guay districts, but 500 square miles were sold to the Rhodesia Copper Co., Ltd., leaving 5 blocks of 10 square miles each, on either side of the northern reach of the Kafue river, scattered over an area of 160 miles east and west by 100 miles north and south. Lands include the Silver King, Sable Antelope, North Star, Maurice Gifford, True Blue, Wonder Rocks, Crystal Jacket, Blue Jacket, Bob Lou-Lou, Sugar Loaf, Lishambika, Inyarka, Kwemba, Hippo, and Beehive, in the main concession, also the Chanobi concession of 10 square miles, southeast of the main concession. Of the 11 so-called mines, but 3 are really worthy the name, these being the Chanobi, Silver King and Sable Antelope, the two latter being small, pockety mines. Apparently the lands are being prospected in connection with the Rhodesia Copper Co., Ltd.

The principal copper deposits so far located are at and near sundry ancient workings, located in a belt of limestone, about 10 miles wide, running nearly north and south for almost the entire length of the concession. The limestone belt is flanked and sometimes intruded by talcose, quartzose and micaceous schists, and by granite, feldspar and quartz-porphyries, the copper occurring as irregular deposits in limestone, and in veins traversing schists, with oxidation at surface, the predominant ores being tetrahedrite and chalcocite, with occasional bornite and chalcopyrite, the ores in schists being more highly oxidized than those in limestone. The company has secured ores in greater or less quantities, ranging from 2.5 to 50% copper tenor, and also has ores of lead and zinc, sundry gold claims and a 12" to 24" seam of bituminous coal, with indications of the existence of larger coal measures of better quality.

The company's main camp is at the Silver King mine, in south latitude 14° 36' 11" and east longitude 26° 55', twelve miles south of the northerly reach of the Kafue river. The main shaft was 205' deep at last accounts, the ore body, which apparently is a lense, pinching out before the bottom of the shaft was reached, with the possibility that other lenses will follow.

The Chanobi mine, 45 miles from the Silver King, has 5 shafts on 4 separate outcrops. No. 1 shaft is 100'; No. 2 outcrop has a north shaft of 92' and a south shaft of 98', latter showing favorable copper values at bottom; No. 3 outcrop has a 78' shaft showing chalcopyrite and occasional chalcocite; No. 4 outcrop shows copper carbonates on surface. Apparently the various outcrops are of the same small sulphide vein. The Chanobi has a warehouse, and a compound for native workmen.

The Sable Antelope has 3 shafts, showing high-grade chalcopyrite in a vein of 20' width, on the 50' level.

The Hippo mine has a 99' shaft, showing from depth of 34' to 99' a good vein of 4' 8" average width, assaying 21.36% copper and 2.4 dwts. to 13 dwts

per long ton. A second shaft, of 100′, seems not to have developed any- of especial promise.

The True Blue mine has steam power and a pump. The Sugar Loaf mine an immense ore outcrop standing 120′ high, and a tunnel showing a con- able body of low-grade copper ore. No. 3 shaft of the Blue Jacket mine, deep, shows carbonate copper ores and chalcopyrite.

Transportation is by traction engines to the nearest railroad, which is ned to reach the Kafue river eventually, and probably will touch the .

The management seems good, and some of the copper properties are con- ed promising, but further extensive development will be required before company can become a producer, with any reasonable degree of safety, of the properties having been opened to sufficient depth to give assured age.

THERN EXPLORATION CO. **BRITISH COLUMBIA.**

Office: 655 New York Blk., Seattle, Wash. Mine office: Gribbell Island, na River division, Cassiar district, B. C. Capitalization $500,000, shares ar. Presumably idle.

THERN & GENERAL SYNDICATE, LTD. **RHODESIA.**

Office: 19 St. Swithin's Lane, London, E. C., Eng. H. T. Adams, secre- Organized Apr. 12, 1905, under laws of Great Britain, with capitaliza- £13,050, in 13,000 ordinary shares of £1 par and 1,000 deferred shares of ar. Was organized to take over the Bwana M'Kubwa mine of the esia Copper Co., Ltd., but apparently has done nothing with same.

THERN LIGHT COPPER CO. **NEVADA.**

Mine office: Yerington, Lyon Co., Nev. Lands, 6 claims, said to carry of the strike of a vein of sulphide copper ore 5′ wide on the 150′ level. veloping by shaft.

THERN MINING & SMELTING CO. **SOUTH AUSTRALIA.**

dine office: Mount Rose, South Australia. Lands, in the Lehigh's Creek ct, circa 2 miles north of Mount Rose and about 66 miles northeast of linman mine, show good gassans carrying considerable malachite and some te. Apparently ore occurs in 2 or 3 short pipe veins, with steep westerly ore being mainly sulphide, including chalcocite and chalcopyrite, asso- d with pyrite in a gangue of micaceous slaty shale. Development is by s of 60′, 78′ and 198′. To February, 1906, property, under various owner- , had produced 370,720 lbs. fine copper. Production, last half of 1907, 51 long tons of ore shipped, yielding 17 long tons 17 cwts. fine copper.

THERN ONTARIO CONSOLIDATED COPPER CO., LTD. **ONTARIO.**

Office: Sault Ste. Marie, Ont. Mine office: Dean Lake, Algoma, Ont. ohn H. Gimby, president; A. Cyril Boyce, M. P. P., treasurer; Uriah Mc- en, secretary; preceding officers, Dr. W. E. Gimby, A. A. Burk, A. Jury, . Freemuth, Dr. W. H. Preston and A. B. McMahon, directors; J. A. Mon- , superintendent. Organized 1906, under laws of Ontario, with capitaliza- $1,500,000, shares $1 par, as successor of Northern Ontario Copper Co., Ltd. ands, 768 acres, in the townships of Thompson and Cobden, including the t and Bronson mines, showing 2 contact veins, of about 9′ width, one between clay-slate and a trap dyke, with intrusions of granite and zite, slate, granite and trap being impregnated, near the contact, with ly auriferous and argentiferous chalcopyrite, of low average tenor. No. ft, 9x16′, with 3 compartments, on the south vein, is 130′ deep, showing saying 4.6% copper, 2.5 oz. silver and $1 gold per ton. To end of 1907 several small shipments to Chicago, returning 13.83% copper. Has ary mine buildings *and planned, 1906, a smelter.* Presumably idle.

NORTHERN ONTARIO COPPER CO., LTD. ONTAR

Dead. Succeeded, 1906, by Northern Ontario Consolidated Copper Co., L
Formerly at Dean Lake, Algoma, Ontario. Described Vol. VI.

NORTHERN SIERRA MADRE MINING CO. MEXI

Mine office: Suaqui de Batuc, Ures, Sonora, Mex. Lands are 2 cop
properties, La Reina de Cobre and Providencia, and a silver-lead mine, kno
as El Colosus, lying circa 25 miles west of Suaqui de Batuc. Idle and app
ently moribund.

NORTHERN TERRITORIES MINES OF AUSTRALIA, LTD. AUSTRALI

Office: Broad Street House, London, E. C., Eng. Mine offices: Palme
ton, Northern Territories, South Australia, and Dundas, Montagu Co., T
mania. H. J. Nevill, chairman; T. I. Dyson, manager; H. Simpson, secreta
Organized Jan. 25, 1905, under laws of Great Britain, as a reconstruction
Northern Territories Mining & Smelting Co., Ltd., with capitalization £175,0
shares 10s. par; issued, £160,003.

Lands are in two groups, in South Australia and Tasmania, including
Howley mine and adjoining properties, area 604 acres, circa 70 miles fr
Palmerston and 113 miles by rail from Port Darwin. The copper properties
this group include the Mount Ellison mine, opened by a 143′ shaft, showi
auriferous and argentiferous copper ores, assaying up to 12% in copper ten
The mine is very wet, and apparently nearly exhausted. The Iron Blow mi
has a 196′ main shaft, and a mining plant with an air-compressor, with o
bins at the mine, connected by a one-mile tram with the smelter.

The Yam Creek smelter, in South Australia, formerly had two rev
beratory furnaces, and a converter that was not installed. This smelter, co
pleted 1904, ran 3 months only, treating an average of 66 long tons of o
daily, producing 204 long tons of matte carrying 61 long tons copper, cir
17,500 oz. silver and 350 oz. gold. In 1907 the smelter was dismantled, a
material shipped to Tasmania.

The Northern Territories property includes a 40-stamp mill at the Howl
mine, Yam Creek, and a 20-stamp mill at Brock's Creek. Apparently both s
idle.

The Tasmanian properties include the Adelaide lead mine, area 160 acr
at Dundas, where operations are largely centered, with a small lead smelt

The company and its various predecessors have struggled against financ
difficulties, due mainly to lack of cash, from their births.

NORTHERN TERRITORIES MINING & SMELTING CO., LTD. AUSTRALI

Dead. Succeeded, Jan. 25, 1905, by Northern Territories Mines of A
tralia, Ltd. Formerly at Palmerston, Northern Territories, South Austral

NORTH FORK COPPER MINING CO. WYOMI

Dead. Formerly at Battle, Carbon Co., Wyo.

NORTH FORK COPPER MINING & MILLING CO. IDA

Office: Wardner, Idaho. Mine office: Mullan, Shoshone Co., Idaho. S
Herron, manager. Lands show a 6′ fissure vein in quartzite, carrying cop
erous silver-lead ore, cut by a 715′ tunnel.

NORTH FRANKLIN MINING CO. IDA

Office: Wallace, Idaho. Letter returned unclaimed from former m
office, Mullan, Shoshone Co., Idaho. Organized under laws of Idaho, w
capitalization $1,000,000, shares $1 par. Lands, 6 claims, area 120 acres, n
the Morning mine, in the Hunter Creek district, circa 2 miles north of Mul
having an 80′ shaft and tunnels of 160′, 60′ and 40′, showing argentiferous l
and copper ores.

***NORTH* HORN SILVER & COPPER MINING CO.** UT

Mine office: Frisco, Beaver Co., Utah. C. C. Thompson, president. La

g the Frisco Contact mine, show argentiferous lead and copper ores.

LAKE MINING CO. **MICHIGAN.**

e: 50 Congress St., Boston, Mass. Operating office: Shelden Bldg., n, Mich. Mine office: Greenland, Ontonagon Co., Mich. Stephen R. sident; Alvin R. Bailey, secretary and treasurer; Richard M. Edwards, endent; preceding officers, Henry Tolman and John C. Watson, . Organized Aug. 22, 1908, under laws of Michigan, with capitaliza- 500,000, shares $25 par, fully issued; paid in, $8. Company began with full title to lands and $300,000 cash in treasury. American ., Boston, transfer agent; Federal Trust Co., Boston, registrar. Shares d on the Boston Stock Exchange.

ds, 1,120 acres, in Sections 28, 29, 32 and 33, lying immediately north of the Lake Copper Co. The tract should carry about 880 acres of rlay of the Lake amygdaloidal bed, with circa 7,000' of the strike de. Property also carries the copper bearing series of the Evergreen mygdaloidal beds. The company's lands are traversed by both the Range and Copper Range railways, and are crossed by the Fire Steel

rich copper bearing chute of the Lake Copper Co. apparently rakes to east, hence should be found well mineralized on the property of the ake. Work was begun about the center of the southwest quarter of 8, near the Fire Steel river, but the lands carry an extremely heavy en of alluvium, and, Nov. 15, 1908, the first sand pipe being driven dge was down nearly 400', without having encountered solid rock, and gement was planning to start sinking a second pipe.

company's plans call for a thorough test of the ground, by diamond previous to locating permanent shafts. There is practically no ques- this property carries the extension of the Lake amygdaloid. Prop- idered decidedly promising and management good.

AND DEVELOPMENT CO. **ALASKA.**

e: care of P. A. Tucker, manager, Seattle, Wash. Letter returned d from former mine office, Ketchikan, Alaska. Mine, on Big Harbor, have shipped, to April, 1908, circa 300 tons of ore, secured from de- t work. Company planned a tram-line, with a locomotive. Idle.

MOUNT LYELL CONSOLIDATED MINING CO., N. L. TASMANIA.

e: 60 Queen St., Melbourne, Australia. Mine office: North Mt. ntagu Co., Tasmania. N. Madden, manager. Capitalization £50,000, s. par. Lands, 70 acres, leasehold. Idle some years and apparently

MOUNT LYELL COPPER CO., LTD. **TASMANIA.**

. Absorbed, 1903, by Mt. Lyell Mining & Railway Co., Ltd. Formerly Mt. Lyell, Montagu Co., Tasmania.

MOWRY MINES CO. **ARIZONA.**

. Was organized 1906. Property was the Golden Gate group and 4 properties, shortly north of the Mowry mines. S. M. Franklin was Formerly at Patagonia, Santa Cruz Co., Ariz.

NYMAGEE COPPER MINING CO., N. L. **AUSTRALIA.**

e: Sydney, N. S. W., Australia. Mine office: Nymagee, N. S. W., John Waugh, chairman. Idle.

ONTARIO REDUCTION & REFINING CO., LTD. **ONTARIO.**

e: 88 Yonge St., Toronto, Ont. Works office: Sturgeon Falls, Nipis- . Lieut.-Col. J. I. Davidson, president; A. Ansley, vice-president; ght, secretary; O. L. Young, superintendent. Property is a smelting ilt for treating the silver-cobalt ores of the Cobalt district and the es of the *Nipissing and Algoma districts.*

NORTH PARK (U. S. A.) COPPER SYNDICATE, LTD. WYOMING.

Office: 110 Cannon St., London, E. C., Eng. Mine office: Keystone, Albany Co., Wyo. Henry C. Batchelor, president; H. Blondell, secretary. Organized July 11, 1906, under laws of Great Britain, with capitalization £25,000, shares £1 par; issued, £20,000. Lands, in the Keystone district of Albany county, Wyoming, and in northern Colorado, apparently show values mainly in gold. Is said to plan a 20-stamp mill.

NORTH PLATTE COPPER MINING & SMELTING CO. WYOMING.

Dead. Was a swindle, perpetrated by F. S. Pusey, of Philadelphia. Formerly at Douglas, Converse Co., Wyo.

NORTH POLE MINING CO. COLORADO.

Office: Aspen, Colo. Mine office: Crystal, Gunnison Co., Colo. Jas. T. Stewart, chairman and general manager; Geo. N. Smalley, vice-president; W. Porter Nelson, secretary; Frank Meyer, treasurer; preceding officers, James E. O'Hara, Geo. H. Poor and A. T. Ferris, directors; C. Casagrande, mine superintendent. Organized 1902, under laws of Colorado, with capitalization $500,000, shares $5 par. Lands, 37 claims, area circa 640 acres, in the Rock Creek district, showing 9 fissure veins, of which 3, of 3′ average width, have tunnels of 340′, 680′, 450′, 300′ and 600′, with a total of 3,000′ of openings, estimated to show 100,000 tons of ore, with 50,000 tons blocked out for stoping, ore being mainly chalcopyrite with quartz gangue, claimed to give average returns of 8% copper, 1.5% lead, 2% zinc, 8.75 oz. silver and $1 gold per ton, which estimates are considered excessive. Has a 50-h. p. steam plant, with a 7-drill Rand air-compressor, 15x30′ machine shop, and several other small mine buildings.

NORTHPORT SMELTING & REFINING CO., LTD. BRITISH COLUMBIA.

Controlled and operated by Le Roi Mining Co., Ltd.

NORTH PRINCE LYELL CO., N. L. TASMANIA.

Dead. Formerly at North Mt. Lyell, Montagu Co., Tasmania.

NORTH SHANGO COPPER MINING CO., N. L. AUSTRALIA.

Mine office: Cobar, Robinson Co., N. S. W., Australia. Organized circa January, 1907, under laws of New South Wales, with capitalization £2,640, shares £1 par. Has a shallow shaft showing gold, with indications of copper at greater depth.

NORTH SHORE COPPER & SMELTING CO. ONTARIO.

Dead. A stock-jobbing scheme. Formerly in Aberdeen Twp., Algoma, Ont.

NORTH STAR MINING CO. MICHIGAN.

Office and mine: 420 East McLeod Ave., Ironwood, Gogebic Co., Mich. Peter Lofberg, president; Adolf W. Peterson, secretary. Organized May 1, 1903, under laws of Michigan, with capitalization $25,000, shares $25 par. Lands, 240 acres, under option, showing several cupriferous amygdaloids, on which a 60′ shaft was sunk. Idle several years and apparently moribund.

NORTH STAR MINING CO. WASHINGTON.

Office: 502 Mutual Life Bldg., Seattle, Wash. Letter returned unclaimed from former mine office, Index, Snohomish Co., Wash. J. T. Ronald, president; Hon. John S. Jurey, vice-president; J. S. Chase, secretary; John A. Soderberg, treasurer; preceding officers and E. L. McAllister, directors. Organized 1901, under laws of Washington, with capitalization $1,500,000, shares $1 par. Is controlled, through stock ownership, by Chelan Consolidated Copper Co.

Lands, 70 claims, area 1,200 acres, of which one group, of 11 claims, lying between the Ethel and Bunker Hill-Sullivan properties, shows a 4′ vein with a 6″ paystreak carrying high grade bornite. Development is by a 220′ shaft and crosscut tunnels of 200′ and 600′, with circa 2,000′ of workings. Ore is *mainly* bornite and chalcopyrite, said to give average assays of 10% copper.

econd group of 120 acres lies on the western slope of the Cascade
ns.
third group of 53 claims, on Red Mountain, in the Leavenworth dis-
ng on the eastern slope of the Cascade Mountains, adjoining the
onsolidated Copper Co., is said to show gold ore, with several shafts
-cuts, and tunnels of 20′ and 100′.
properties have several mine buildings, with a flume, water pipe and
ressor.

STAR MINING & MILLING CO. **COLORADO.**

. Property sold to Silverton Mining Co. Formerly at Silverton,
Co., Colo.

STATE GOLD & COPPER MINING CO. **NORTH CAROLINA.**

office: Jamestown, Guilford Co., N. C. Has a vein of 2′ to 25′
rrying auriferous copper sulphides, opened to depth of circa 400′.
n and water power, 50-ton concentrator and a mill with 20 gravity
Idle.

UTAH MINING CO., OF BINGHAM. **UTAH.**

office: Bingham Canyon, Salt Lake Co., Utah. Organized Feb. 23,
er laws of Maine. No trace of operations secured.

VERDE COPPER CO. **ARIZONA.**

: 303-167 Dearborn St., Chicago, Ills. Mine office: Jerome, Yava-
riz. W. P. Cooper, president; E. C. Weatherley, vice-president; John
general manager; J. J. O'Donohue, secretary and treasurer; J. F.
superintendent. Organized January, 1904, under laws of Arizona,
talization $3,000,000, shares $1 par. Lands, 6 claims, area 120 acres,
United Verde, having an 80′ shaft and a 250′ tunnel, latter showing
iron and soft rock, in a zone of circa 150′ width, with a very little ore
about 2.5% copper and 3 oz. silver per ton, with traces of gold. Equip-
udes a 40-h. p. Fairbanks-Morse double-cylinder hoist and an air-com-
Lands were jumped, January, 1908, but company claims 1907 assess-
k was done properly, and jumping illegal. Idle and practically mori-

VEST COPPER CO. **BRITISH COLUMBIA.**

. Operated the Van Anda mine, 1901-1902. Formerly at Van Anda,
land, B. C.

VESTERN CONSOLIDATED LUMBER, **OREGON.**
& COPPER CO.

: care of Glenn M. Deuell, secretary, Grand Rapids, Mich. Mine
aker City, Baker Co., Ore. Dr. O. A. Lacrone, president and general
Idle several years and presumably moribund.

VESTERN COPPER MINING CO. **WYOMING.**

: 509 New York Life Bldg., Omaha, Neb. Letter returned un-
rom former mine office, Dillon, Carbon Co., Wyo. Chas. R. Courtney,
W. D. Reed, vice-president; F. E. Brown, secretary and general
N. A. Kuhn, treasurer; H. H. Roberts, secretary; preceding officers,
kin, J. H. Farlie, C. W. Murdock and R. E. Sutherland, directors; C. A.
perintendent. Organized 1902, under laws of Wyoming, with capi-
$100,000, shares 10 cents par.
, 15 claims, area 300 acres, including the Batchelder group of 9
l the Eclipse group of 6 claims. The Batchelder mine, in the Battle
riet, circa one mile from the Ferris-Haggarty mine of the Penn-
Copper Co., carries about one mile of the strike of a vein, formerly
of 10′ to 50′ width, but apparently of 2′ to 15′ actual width, which
is a continuation of the Ferris-Haggarty vein. Development is by
d a 100′ shaft, with *circa 1,000′* of workings, showing some copper

oxides and carbonates, with mainly auriferous sulphide ores of concen grade, giving assays of 3 to 40% copper and $2 to $20 gold per ton. ore was shipped, late 1907, to the Penn-Wyoming smelter. Property con promising. Idle.

NORTHWESTERN GOLD & COPPER MINING CO. OR

Mine office: Susanville, Grant Co., Ore. J. R. Murrin, general m Lewis Walker, superintendent. Organized circa 1907. Lands, 9 claims, by a shaft of 90′ and a tunnel of 120′, showing good gold and copper

NORTHWESTERN MINING CO. I

Office: Baltimore, Md. Mine office: Lucile, Idaho Co., Idaho. E 18 men. Wm. B. Clark, president; Francis T. Homer, vice-president; C Heim, secretary and treasurer; Frank E. Johnesse, general manager. Or May, 1905, under laws of New Jersey, with capitalization $200,000, sh par. Lands, 10 claims, area 200 acres, surveyed for patents, and a 5-ac site, showing diorite, diabase and altered schists, having 2 ore bodi mated to range 40′ to 70′ in width, carrying oxidized ores above cir depth, followed by native copper, chalcocite and chalcopyrite, ore bei mated to average 5% copper, 5.5 oz. silver and $2.80 gold per ton. D ment is by shafts of 100′ and 650′, and an 868′ tunnel, with circa 4 workings, estimated to show 60,000 tons of ore, with 25,000 tons bloc for stoping. Company expects a railroad by 1910, and plans productio after.

NORTHWESTERN SMELTING & REFINING CO. BRITISH COLU

Dead. Smelter sold, 1905, to Britannia Smelting Co., Ltd. Form Crofton, Vancouver Island, B. C. Described Vol. IV.

NORTHWEST GOLD & COPPER CO. OR

Dead. Formerly at Sumpter, Baker Co., Ore.

NORTHWEST MINING CO. WASHI

Dead. Formerly at Kettle Falls, Stevens Co., Wash.

NORTH WISCONSIN COPPER MINING CO. WISC

Dead. Succeeded, circa 1899, by Chippewa Copper Mining Co., als Formerly in Douglas county, Wisconsin.

A. O. NORTON. QU

Office: 286 Congress St., Boston, Mass. Mine office: Suffield, She Co., Que. A. O. Norton, manager; Wm. Jenkins, superintendent. La acres freehold, and 150 acres of mining rights in Ascot township, from Sherbrooke, with railroads within 2 miles on either side. P known as the Suffield and King mines, opened circa 1865, has a 165′ sh about 900′ of workings, on a vein of 8′ to 9′ average width, and a s 245′ on a vein of 2′ to 20′ width, developing ore said to give averag of 6% copper, from a trace to 10% zinc, 10 to 120 oz. silver and $2 per ton. Equipment includes a plant, installed 1907, having hoists, and power-drills. Property considered promising.

NORVELL-PICKRELL COPPER MINING CO. WY

Dead. Formerly at Encampment, Carbon Co., Wyo.

NORWAY MOUNTAIN GOLD & COPPER MINING CO. BRITISH COL

Dead. A swindle, put out by Thomas & Co., Philadelphia, who "" teed" dividends that never materialized. Formerly at Rossland, T trict, B. C.

NORWEGIAN-AMERICAN COPPER MINING & SMELTING CO. NO

Office: 1618 Milwaukee Ave., Chicago, Ills. Mine offices: 3 Fjo Trondhjem, Norway, and Goulasjok, Lyngenfjord, Tromsö, Norway. 700 men. Adolph Larson, president; John Iverson, vice-president; An

IAN COPPER MINES LTD NORWAY

IAN EXPLORATION CO. LTD NORWAY

GIAN OTTA COPPER CO. LTD NORWAY

AY GOLD & COPPER MINING CO. COLORADO

RA MINE. ITALY

office: Novara, Piedmont, Italy.

ducer, at last accounts.

AD MINERA NUESTRA SEÑORA DE LA SALUD SPAIN

e: Sevilla, Spain. Mine office:

Don Manuel Piérola y Orores, manager.

ld mine openings, idle for some years.

secured by leaching tereros left from former

AD MINERA NUEVA AMALIA. CHILE

office: Chuquicamata, Antofagasta, Chile.

UEVA AUSTRALIA. PERU

office: Pacasmayo, Cajamarca, Peru.

z, smelter superintendent. Mine has a lease of

pyritic ore, of considerable size, opened by tunnel. Has a smelter with ing and reverberatory furnaces, burning wood, which is of good quali available in large quantities. Product is shipped, as bars, to Cajamarca

COMPAÑIA MINERA LOS NUEVES.

Dead. Formerly at Tijola, Almería, Spain.

NUMBER ONE MINING CO. **WASHIN**

Mine office: Nighthawk, Okanogan Co., Wash. A. B. Lee, manager is said to have a 33′ vein carrying a 9′ paystreak of ore of concentrating containing lead and copper values, developed by tunnel and shaft. Is plan a 25-ton mill.

NUMBER 7 MINING CO., LTD. **BRITISH COLU**

Dead. Property sold to British Columbia Copper Co. Formerly at wood, Boundary district, B. C. Described Vol. V.

NYACK MINING CO. **AR**

Dead. Absorbed by Anita Consolidated Copper Co. Formerly at W Coconino Co., Ariz.

NYMAGEE COPPER, LTD. **AUST**

Office: 95a Winchester House, Old Broad St., London, E. C., Eng office: Nymagee, Mouramba Co., N. S. W., Australia. Chas. J. M chairman; W. H. Corbould, managing director; J. D. Kendall, co engineer; H. A. McMahon, secretary. Organized Dec. 10, 1906, under Great Britain, with capitalization £150,000, shares £1 par, fully paid. circa 50 miles from Cobar, include the Nymagee mine, area 750 acr hold, bought, 1907, of the Great Cobar Copper Mining Syndicate. rocks are slate and sandstone, showing a main vein of 15′ to 20′ widt ing ore of about 2% average copper tenor, with a rich chute, of ab length and unknown depth, carrying ore up to 10% in copper tenor. opened 1880, has 3 shafts, deepest 680′, with about 100,000 tons of ore out, and 150,000 long tons additional reasonably inferred. Developm depth are said to be promising. Old mining plant was replaced, modern machinery, involving suspension of production for six month mine lacks railway facilities, which are much needed.

The smelter has 3 small water-jacket blast-furnaces, and 4 reverbe for bringing up matte to blister copper of 99.5% copper tenor. Largest tion, in 1886, was 1,468 long tons fine copper. Production, 1898, was tons fine copper, and for 1906 was 26,649 long tons of ore smelted, givi age returns of 2.5% copper, producing 1,491,840 lbs. fine copper. considered valuable, though average of ore is dangerously low in grad ploys circa 200 men.

NYMAGEE COPPER MINING SYNDICATE. **AUST**

Dead. Lands sold to Great Cobar Copper Mining Syndicate. at Nymagee, Mouramba Co., N. S. W., Australia.

OAK CONSOLIDATED MINING & MILLING CO. **O**

Office: 226 Failing Bldg., Portland, Ore. D. L. McLeod, manager erty includes the Oak and Hidden Fortune mines, in Josephine and counties, Oregon.

OAKESDALE COPPER CO. **MO**

Office: Wallace, Idaho. Mine office: Java, Dawson Co., Mont. zation $1,000,000, shares $1 par. Lands, 8 claims, 1 fractional, on Creek. Development is by tunnel, showing ore assaying up to 59.9% 6 oz. silver and $4 gold per ton.

OAKS MINING & MILLING CO.

Office: Eagle Block, Salt Lake City, Utah. Mine office: Alta, S Co., Utah. A. H. Cutright, secretary and treasurer. Capitalization

OASIS GOLD & COPPER MINING CO. **UTAH.**

Office: care of Joseph A. Jennings, secretary, Salt Lake City, Utah. Mine office: Oasis, Millard Co., Utah. M. S. Browning, president; John T. White, vice-president; Joseph B. Toronto, treasurer; J. D. Clive, manager. Organized April, 1904, under laws of Utah, with capitalization $250,000, shares $1 par. Lands, in the Drum district, are opened by a 185′ shaft, showing 6 ore chutes, from which ore assaying 4.3% copper, 10 oz. silver and $19.20 gold per ton, was shipped, 1904, to Salt Lake smelters. Idle several years.

OATES-NEWMAN COPPER CO. **ARIZONA.**

Mine office: Globe, Gila Co., Ariz. F. C. Alsdorf, superintendent, at last accounts.

OAXACA CONSOLIDATED COPPER CO. **MEXICO.**

Office: Ap. 49, Oaxaca, Oax., Mex. C. C. Lastinger, manager, at last accounts. Property includes the Magistral and Predilecta mines, near Oaxaca, carrying copper ores. Has water power.

OAXACA EXPLORATION CO. **MEXICO.**

Mine office: Ocotlán, Oaxaca, Mex. Has auriferous and argentiferous copper ores, opened by 2 shafts, of about 150′ each, and is equipped with steam power. Presumably idle.

OAXACA MINES & EXPLORATION CO. **MEXICO.**

Office: care of Kaye, DeWolf & Co., New York, N. Y. Works office: Oaxaca, Oaxaca, Mex. Harry M. Holbrook, president; O. F. Westlund, general manager; R. R. Moore, superintendent; Jos. T. Wallace, receiver.

Property is a smelter, 4 kilometers from Oaxaca, completed August, 1907, rated at 600 tons daily capacity, having two 46x162″ water-jacket blast-furnaces, 22′ high over all. These are planned for reduction of either lead or copper ore, with daily capacity each of about 175 tons of lead ore or 300 tons of copper ore. Has electric power and crushers. Receiver appointed, and bondholders plan reorganization. With finances on a substantial basis, and given good management, the plant might prove successful, as it could draw ore from a rich district.

OAXACA MINING, MILLING & INVESTMENT CO. **MEXICO.**

Office: Wilmington, Del. Mine office: Ixtlán de Juárez, Ixtlán, Oaxaca, Mex. C. C. Arthur, manager; Robert McCormick, superintendent. Property includes La Esperanza mine, having auriferous and argentiferous lead, copper and zinc sulphides, with water power and 10-stamp mill.

OAXACA SMELTING & REFINING CO. **MEXICO.**

Dead. Property was sold, circa July, 1908, at public auction, and was bought in, by bondholders, for $275,546. Formerly at Oaxaca, Oaxaca, Mex.

OE MINE. **JAPAN.**

Mine office: Nakanosha-mura, Tsu-gori, Bitchu, Japan. Employs circa 100 men. T. Sakamoto, owner; K. Ogawa, manager. Is a very old mine, having numerous 2′ to 4′ veins carrying chalcopyrite, and small quantities of argentiferous galena, with quartz gangue, traversing clay-slate and granite. Has steam power and a good smelter. Production was 1,281,146 lbs. fine copper in 1903; 1,455,488 lbs. in 1906, and 1,541,806 lbs. in 1907.

O. GRAY COPPER CO. **NEW JERSEY.**

Dead. Formerly at Pennington, Mercer Co., N. J. Described Vol. VI.

OCALA COPPER CO. **NEW MEXICO.**

Mine office: Silver City, Grant Co., N. M. R. P. Thompson, superintendent. Lands, in the Burro Mountains, said to give a promising surface showing, with a 185′ shaft, showing low grade copper sulphide ore.

OCAMPO MINING CO. **MEXICO.**

Mine office: Cuatro Ciénegas, Monclova, Coahuila, Mex. José Marco, manager. Lands include El Barrio *mine, carrying* auriferous and argentiferous

copper ores, equipped with steam power. Employed circa 100 m accounts.

CAMILO OCAÑA.

Office and mine: Taltal, Antofagasta, Chile. Ramón A. H David B. Contreras, superintendents. La Estrella de Venus mine, depth of 125 meters, but hampered in operation by excess of wate ore said to average 24.1% copper, after selection. La Ligua and La mines carry auriferous and argentiferous copper ores. Equipme steam power and a concentrator with 4 Chilean mills. Mine and wor circa 75 men.

OCCIDENTAL COPPER CO.

Office: 120 Broadway, New York, N. Y. Mine office: Hach Co., N. M. Idle. Saml. W. Fergusson, president and general manag R. Hensey, vice-president and treasurer; Joseph R. Draney, secretar ing officers, Garth W. Fergusson, Emlyn Lewys, Anthony J. Rom Rosendale, Geo. F. Small and Horace P. May, directors. Organize 1906, under laws of Arizona, with capitalization $5,000,000, share issued, $3,025,000, as successor of the Royal Morelos Copper Co. An ing, first Tuesday in December.

Lands, circa 700 acres, in the Suna Rica district of Chihuahu 7 miles south of El Paso & Southwestern railway and just south of Mexico line, showing limestone, with eruptive dikes, carrying mainly ores, with some bornite and chalcopyrite. Development is by 5 pits a of 16′ to 68′ depth, and a small tunnel. Property has 8 buildings. I

OCCIDENTAL MINING CO. CAL

Office: 6 Eddy St., San Francisco, Cal. Mine office: Keswi Co., Cal. Lands are claimed to be 3 miles south of the Iron Moun opened by 2 tunnels. Company's advertising is filled with miss and corporation presumably is merely a stock-jobbing device.

MINERAL DE COBRE LOS OCOTES, S. A.

Dead. Lands sold, 1906, to Teziutlán Copper Mining & Smeltin $565,000. Formerly at Ejutla, Oaxaca, Mex. Described Vol. VI.

OCTAVIA MINING CO. W

Mine office: Cambria, Weston Co., Wyo. David Jones, presiden 54 claims, including the Straight Up group, near the head of Ja slightly developed by a 60′ tunnel. Idle, since circa 1904, but f assessment work.

ODIN MINING CO.

Mine office: Park City, Summit Co., Utah. Main tunnel, 740 Odin and Columbus veins, former, of about 2′ width, showing an a about 3% copper, with some ore assaying up to 4% copper, 40% le oz. silver per ton. First smelter shipment returned 2.7% copper, 1 40 oz. silver and $2 gold per ton.

O'DONNELL COPPER CO. A

Dead. Formerly at Clifton, Graham Co., Ariz.

OGDEN BUCKHORN MINING CO.

Office and mine: Ogden, Weber Co., Utah. F. L. Woods, mana S. Burbank, superintendent. Lands, in Coldwater Cañon, shortly east have a 12′ vein, with paystreak giving assays of 34% copper, 9 oz. oz. gold per ton.

OGOYA MINE.

Mine office: Nishio-mura, Nomi-gori, Kaga, Japan. T. Yokoya and general manager.

Mine, opened 1878, carries chalcopyrite, associated with n cassiterite, bornite, native copper and pyrite, with quartz gangue, in

traversing liparite. Three practically parallel veins main are worked, ranging 1" to 4' in width, and 500' to 2,000' in length. Mining plant is n, and property has a hydro-electric power installation. Smelter is rated ly 30 tons daily capacity, but probably is larger. Production was 967 lbs. fine copper in 1906 and 1,412,706 lbs. in 1907, an increase of ally 50% in eight years.

RA MOUNTAIN GOLD & COPPER CO. **NEVADA.**

lice: Denver, Colo. Mine office: Reno, Washoe Co., Nev. Alleged y was claims in the Grapevine district of Nevada, and O'Hara, the er, is a professional bunco-steerer, masquerading as a mine promoter. arrested, tried and found guilty of swindling operations in connection e promotion of this company, and for punishment was given a light a sentence of one day in jail, which leads to the inevitable conclu- d there is a very strong sentiment in Denver in favor of fake mining rs. Denver is one of the most beautiful towns in the United States, population includes some of the greatest scoundrels in existence, and n unenviable reputation among investors as the hatching place of a le of fraudulent mining companies. So notorious is this fact that te mining companies with offices in Denver are seriously handicapped.

ARIZONA COPPER MINING & SMELTING CO. **ARIZONA.**

d. Corporation dissolved, 1903. Formerly had an office in Covington, Ky.

COLORADO SMELTING & REFINING CO. **COLORADO.**

e and works: Salida, Chaffee Co., Colo. John M. Thomas, general ; Geo. B. Griswold, superintendent. Smelter, rated at 1,000 tons daily , is equipped with steam and electric power and has a refinery, doing l custom smelting business in gold, silver, lead and copper ores, from Juan district and elsewhere in Colorado.

OPPER CO. **UTAH.**

e: 42 Broadway, New York, N. Y. Mine office: Bingham Canyon, e Co., Utah. Jas. MacFarlane, president; Russell Hopkins, first vice- t; Carlos Warfield, second vice-president; George Baglin, secretary surer; preceding officers, David Keith, Thos. Weir, N. J. Catrow, J. P. son, F. August Heinze and Philip Carroll, directors; Duncan McVichie, manager; Colin MacIntosh, superintendent; W. A. Kidney, mill super- t.

nized Nov. 1, 1903, under laws of Maine, with capitalization 0, and reorganized, 1907, under laws of Maine, with capitalization 00, shares $10 par, and an increase in capitalization to $15,000,000, 0 par, was authorized February, 1908. Is controlled by United Copper ugh ownership of about two-thirds of stock issue.

ls authorized, $2,000,000 ten-year 6% gold bonds, in denominations of ated Sept. 1, 1907, convertible into stock at $10 per share, at any ore maturity. Previous to new bond issue of 1908 company was said irca $350,000. Company plans a sinking fund, calling for $120,000 eginning Sept. 1, 1910.

s, 14 claims, patented, area 120 acres, surrounded by holdings of Copper Co., Boston Consolidated, United States, Fortuna and Copper Property was bought of the Columbia Copper Mining Co. for $245,000. ore body formerly was a vein carrying disseminated chalcopyrite, width of 30' on the 400' level, but the principal ore, as developed is cupriferous monzonite, similar to that of the Utah Copper Co. and nsolidated, but said to concentrate somewhat better. Late 1907 the had developed ore under about 5 acres, the porphyritic ore body mated at 400' in width, 1,000' in length and 600' in depth, latter

figure being considered excessive, and company estimated, September, having ore reserves of 13,484,855 tons, averaging 1.606% in copper tenor.

Development is by several shallow shafts, one showing a 3' vein carr an 8" paystreak of malachite averaging circa 25% copper, balance of being disseminated cuprite, estimated to average 5.12% copper. The 3- partment 580' main shaft, begun circa October, 1906, sunk at an angle of is to be connected, at depth of 1,100', early 1909, with the Mascotte tu of the Dalton & Lark, circa 2½ miles in length. The Mascotte tunnel been enlarged, retimbered and double-tracked, and ore extraction will be electric haulage, with 5-ton cars. In addition to the Mascotte tunnel, property has an 800' main crosscut tunnel, which intercepts the What C and All's Well veins, lying 400' apart and parallel. The All's Well show 6' vein assaying up to 5% copper, with small gold values, and a winze on What Cheer vein is said to show 11' of rich sulphides. Ores shipped by old management were said to average 12% copper.

The property includes an old gravity mill with 5 stamps, and a 20-ton centrator, both remains of former ownership, and both idle.

The Winnimuck mill, bought 1904, and enlarged to circa 150 tons d capacity, has 1 crusher, 3 sets of rolls, 1 Chilean mill, 4 three-compart jigs, 50 Wilfley tables and 1 Wilfley slime table.

The new mill, at Lark, near the mouth of the Mascotte tunnel, is of construction, built, 1907, by the Minnesota Steel Co., at a cost of $200,000. This mill, variously rated at 4,000 to 4,500 tons capacity, when pletely equipped, is in eight 500-ton units, of which 4 were practically pleted at the end of 1908, when the mill was expected to be in operation d the first quarter of 1909. Water is supplied from wells in the valley.

The company had financial troubles, in common with many other d oping copper mines, during 1907 and 1908, and considerable property attached for debt, but the debts were adjusted with money secured fro new bond issue.

On test the old Winnimuck mill is said to have given extraction 85% of assay values, and the company estimates that the new mill should 75% of the gross values, or circa 24 lbs. fine copper per ton, from the por ores. The ore is said to concentrate as high as 15 into 1, making a 20% c concentrate, at a cost under 50 cents per ton for milling, and the com estimates that the ore can be mined at a cost of 75 cents per ton. Pro copper costs from the porphyry ores are variously estimated, by differe thorities, at 6 to 9 cents per pound, but it is probable that finished c laid down at the seaboard, will cost much nearer to 10 cents than to 6. property is considered one of exceptional promise.

OHIO LEAD MINING & SMELTING CO. NEV

Office: Salt Lake City, Utah. Mine office: Sprucemont, Elko Co., Lands, 8 claims, area 160 acres, showing 7 fissure veins, said to give a assay values of 7% copper and 7 oz. silver per ton, also a silver-lead opened by a 400' shaft and tunnels of 700' and 900', with circa 3,000' of ings. Has a 50-ton concentrator, and a smelter with 3 small water-jacket furnaces. Presumably idle.

OHIO-MEXICAN MINING CO. ME

Office: 1703 First National Bank Bldg., Cincinnati, Ohio. Mine Caborca, Altar, Sonora, Mex. J. H. McKibben, president; John Hend vice-president and general manager; W. K. McKibben, secretary and urer; preceding officers, O. E. Peters, B. B. Tuttle and Hon. J. A. R directors; I. R. Henderson, mine superintendent; Oscar A. Nemingar, *superintendent*. Organized August, 1904, under laws of Arizona, with ca *ization* $3,000,000, shares $10 par. Lands, 47 acres, also a 25-acre millsit

0 acres ranch lands, showing country rocks of limestone and granite, with phyritic intrusions, carrying several ore bodies, of which 3, under develeat, have estimated average widths of 16', 20' and 40', opened by shafts of 156', 156', 210' and 100' and by a tunnel of 380', with total openings of 4,000', estimated to show 30,000 to 60,000 tons of ore, with 20,000 tons ked out for stoping, giving average assays of 9.3% copper, 4 to 10 oz. r and $2 to $5 gold per ton, from carbonate ores and chalcocite. Mine worked 1857-1860, and reopened, 1904, by present company. Property has h. p. steam plant at the mine, and a 100-h. p. steam plant at the smelter. ment includes 3 hoists, good for 400' to 600' depth, and a 2-drill Rand mpressor, with 15 shops and mine buildings, of wood, sheathed with iron. he smelter, at Calera, receiving ore by wagon from the mine, has a 60-ton jacket blast-furnace, turning out black copper of 90 to 95% tenor, with ed gold and silver values, shipped to the Nichols Copper Co. for electrorefining. Presumably idle.

MINES DEVELOPMENT CO., LTD. **BRITISH COLUMBIA.**

ad. Succeeded, 1907, by True Fissure Mining & Milling Co. Formerly t Lake, Kootenay district, B. C.

MINING CO. **ARIZONA.**

tter returned unclaimed from former mine office, Bisbee, Cochise Co., Is controlled by Bisbee-Sonora Development Co., through ownership of stock issue. Lands, circa one mile southeast of the Warren Develop- o., are variously reported as 1,495 acres, and as 18 claims, area 340 aid to show 2 low grade copper outcrops. Company is said to plan a , erection of which would be highly ridiculous, until ore is found. considered poorly located.

MINING & MILLING CO. **COLORADO.**

ne office: Montezuma, Summit Co., Colo. Ores carry gold, silver and Has a small concentrator. Presumably idle.

TENNESSEE MINING CO. **ARIZONA.**

ce: care of W. D. Clymer, president and superintendent, Delaware, Mine office: Wickenburg, Maricopa Co., Ariz. Lands, 10 miles south enburg, have a 115' shaft, showing a 2' vein.

AQUI MINING CO. **MEXICO.**

ce: Columbus, Ohio. Mine office: San Javier, Soyopa, Hermosillo, Mex. Lands include the Sierra mines, said to be antiguas, having an nel cutting a 2' vein carrying ore assaying up to 2% copper and 75 r per ton.

OS MINING CO. **CHILE.**

d. Lands sold to Copiapó Mining Co., Ltd. Formerly at Copiapó, , Chile.

ÑIA MINERA DE OJANCOS NUEVOS. **CHILE.**

e: Valparaiso, Chile. Mine office: Tierra Amarilla, Antofagasta, Thos. C. Peddar, manager. Organized Apr. 30, 1903, under laws of ith capitalization £150,000, shares £1 par. Property is the Transito

Y MINING CO. **MICHIGAN.**

e: Lyceum Bldg., Duluth, Minn. Operating office: Houghton, Mich. ice: Phœnix, Keweenaw Co., Mich. Dr. L. L. Hubbard, president eral manager; Chas. A. Duncan, first vice-president and treasurer; Huggart, second vice-president; preceding officers, Thos. F. Cole, Capt. tson, Capt. Thos. Hoatson, Chas. d'Autremont, Jr., Chester A. Congdon, Ryan and Oscar J. Larson, directors; Frederick Kennedy, secretary; ormis, superintendent; *Capt. Richard* Trevarthen, chief mining eay

tain; Henry Roberts, assistant superintendent; Wm. H. Charlton, clerk; Stephens, master mechanic.

Organized June 8, 1907, under laws of Michigan, with capitaliz $2,500,000, shares $25 par; issued, $2,100,000. Company began business circa $500,000 cash, and June 1, 1908, had cash resources of $227,342, and not need to call for further funds until about the middle of 1909.

Lands, circa 1,600 acres, bounded on the north by the Cliff and on south by the Seneca. Property includes the old Manhattan tract, Bac Jacobs lands, property bought of the Union Copper Land & Mining Co., the Miskwabik tract of 1,224 acres, in Section 5, Town 57, and Sectio and 33, Town 58, North, all in Range 31 West.

The Kearsarge lode was located, circa 1904, on the Miskawabik t about 4 miles northeast of No. 1 shaft of the Mohawk. The Kearsarge was proven by 5 diamond drill holes, crossing the formation at interval 1,200', of which 4 holes gave good cores, predicating the making of a mine, the cores being especially rich well toward the northern limits o tract. The drill cores showed the Kearsarge amygdaloidal bed to be di into 4 sections, separated by narrow layers of trap, and underground wor verified this peculiar condition.

Development is by 2 shafts, both sunk at an average depth of circa 4 the footwall, which shows some heavy copper, indicating strong miner tion. Work was begun July, 1907, and good progress has been made. shafts are concreted from their collars into the rock ledge, and both permanent concrete roadbeds.

No. 1 shaft, circa 1,500' from the northern boundary of the property sinking for the 650' level at the end of 1908. A crosscut to the west on the 500' level, late 1908, penetrated a 30' amygdaloidal bed, thought the lower footwall bed of the Kearsarge lode, with principal ore value pected in the upper bed, and the second bed from the base of the series opened November, 1908, this being about 20' in width.

No. 2 shaft, about 1,100' southwest of No. 1, was circa 500' deep a end of 1908, opening a well mineralized bed of about 15' width.

The power plant is unusually complete for a new property. The central power-house, between the two shafthouses, has 2 duplicate Nor duplex-cylinder hoists, good for about 2,000' depth, the cables from the e passing over idlers and turn-sheaves at each shaft. Steam is furnish 150-h. p. Burt locomotive-firebox boilers, the steam plant having a 10 condenser. Buildings are heated by the Webster reheating system, charg exhaust from the air-compressor, which also heats water for boiler feed. power plant includes an air-compressor and a 140-h. p. Russell high-spe gine, belt-connected to a 100-kw. generator. Power is furnished the v shops by individual motors, and the mine has an electric pump, with ca of 85 gallons per minute working against a 500' head. There also is an e light plant.

Near the central power plant are a carpenter-shop, smithy and ma shop, each 24x48' in size, and a warehouse with an office in front. The ma shop has a hardwood floor, laid with 2x4" stringers, bedded in concrete. also is a 28x48' bunk-house and 24 dwellings for employes, at a townsite one-half mile from the shafts, the mine and townsite having hydrants complete water system, with ample fire protection.

The mine is served by the Keweenaw Central railway, a short spur the main line reaching the shafts and buildings.

The Ojibway has an exceptionally strong and experienced manage and is being developed along systematic and well considered lines, with *prospect of* making an excellent mine.

CKS, LTD. **AUSTRALIA.**

Cairns, Queensland, Australia. Mine office: Mungana, Queensalia. A. J. Draper, secretary; A. F. Martyn, mine manager. Has f sulphide copper ore. Decided, June, 1908, to liquidate.

ER MINES DEVELOPMENT SYNDICATE, N. L. **AUSTRALIA.**

Cairns, Queensland, Australia. Mine office: Chillagoe, Queensalia. John Newell, chairman; preceding officer, E. B. Torpey, W. and A. Overend, directors; Thos. Welsby, secretary; Richard Shepal manager; H. Twynam, mine manager. Organized under laws of with capitalization £45,000, shares 2s. par. Dividends, 1906, were ., and for first half of 1907 proceeds were £88,637 and profits aid a 1s. dividend Oct. 31, 1907.

haft, early 1907, was 300′ deep, with 4 levels opened, at 80′, 115′, ′, levels being much too close together, with a plat cut at 250′. Little t work was done during the era of high prices, 1906-1907, until late sinking was resumed. This should have been done several years company was badly cramped after the fall in copper. A new ore een opened to the east of the old lode, on the second and third er levels make considerable water. Mine had reserves of 23,400 d out, at end of 1907, ore as smelted running 9 to 10% copper. ill borings, 1907, show the main lode to carry 12% copper at depth eating that the mine will hold values to good depth. Property also rn ore body, cut by drill holes, giving cores assaying 7.5% copper. equipment was overhauled and amplified, 1906, now including a plant, air-compressor, etc. District is arid, causing occasional water, but with frequent excess of water in the rainy season, roads and rendering transportation difficult. Camels, formerly een replaced by traction engines. A railroad, which would greatly of operation, is needed badly.

lter has a converter, added 1906, and a new stack was built, 1907, troublesome fumes. For first half of 1907 actual cost of blister e mine was £40 12s. 6d. per long ton, and for last half of 1907 yielded 8.1% copper, showing a decline in values. Production, 3,867 long tons of ore smelted, giving an average return of 10.8% making 3,351,197 lbs. fine copper. Mine is valuable, but company was overly anxious for dividends, when it would have been much ve accumulated a surplus for emergencies. With a continuance vigorous policy of development, begun 1907, the property should importance and production. Employs circa 250 men.

ENSION MINING & REDUCTION CO. **UTAH.**

222 D. F. Walker Bldg., Salt Lake City, Utah. Mine office: Mil- Co., Utah. A. J. McMullen, president and general manager; T. vice-president; C. C. Gott, secretary and treasurer. Organized 1899, under laws of Utah, with capitalization $150,000, shares 50 Annual meeting, second Tuesday in October.

21 claims, 3 patented, area 420 acres, near the Majestic, in the district, showing 2 fissure veins, of 5′ to 24′ estimated average able circa 2,000′, opened by 7 pits and shafts, of 15′ to 510′ depth, 0′ tunnel, with 1,045′ of workings, showing chalcopyrite estimated 2% copper, without the gold and silver values formerly claimed. eral years, except for annual assessment work.

ING DER KÖNIGLICHE PREUSSISCHEN- UND **GERMANY.**
GLICHE BRAUNSCHWEIGSCHE KOMMUNION
N-STAATSWERKE OKER.

melting plant of the Rammelsberg mine.

O. K. GOLD & COPPER MINING CO. ARIZONA.

Office: Lyndon, Kansas. Letter returned unclaimed from former mine office, Florence, Pinal Co., Ariz. W. L. Newcomer, president; S. B. Johnson, secretary; J. Banning, treasurer and general manager. Organized 1902, under laws of Arizona, with capitalization $1,000,000, shares $1 par. Lands, 15 claims, area 300 acres, in the Picacho district, showing numerous veins, of which two, of 3′ average width, are opened by 6 shallow shafts, deepest 120′, and by 4 tunnels, longest 125′, showing oxide, carbonate and sulphide ores, giving assays up to 20% copper, with traces of gold and silver. Idle several years and apparently moribund.

OKLAHOMA COPPER CO. ARIZONA.

Office: Shawnee, Okla. English office: Worcester House, Walbrook, London, E. C., Eng. Mine office: Florence, Pinal Co., Ariz. Idle. H. G. Beard, president and general manager; S. T. Pierson, vice-president; H. A. Pierson, secretary and treasurer; preceding officers and W. M. Longmire, directors; Roy Troxel, superintendent. Organized March 29, 1906, under laws of Oklahoma, with capitalization $2,000,000, shares $1 par; issued, $1,120,000.

Lands, 25 claims, unpatented, area circa 500 acres, next south of the Ajax Central Copper Co., in the Mineral Hill district, said to show 5 ore bodies, of which one, under development, of 10′ claimed width, said to be traceable 2½ miles, is estimated by company to average 3% copper and $2 gold per ton, from oxidized ores and chalcopyrite. Development is by 8 pits and shafts, of 20′ to 200′ depth, and by a 50′ tunnel. The advertising of Joseph & Wilson, the fiscal agents, was not altogether correct. Idle.

O. K. SOUTH BLOCK CO. AUSTRALIA.

Mine office: Mungana, Queensland, Australia. Lands, adjoining the O. K. Copper Mines Development Syndicate, N. L., have a 100′ shaft, with steam power.

OKUZU MINE. JAPAN.

Mine office: Okuzu-mura, Kita-Akita-gori, Ugo, Japan. Property shows numerous fissure veins, of about 1′ average and 3′ maximum width, traversing Tertiary tuff and augite-andesite, carrying argentiferous chalcopyrite, associated with pyrite and occasional sphalerite. Mine, near Hanawa, discovered 1604, was worked for 2 centuries for silver, making but a trivial amount of copper as a by-product, but in the past few years the copper output has increased, production having been 143,597 lbs. fine copper in 1906, and 131,467 lbs. copper, 6,404 momme silver and 2,739 momme gold in 1907.

OLALLA COPPER MINING & SMELTING CO. BRITISH COLUMBIA.

Office: Second National Bank Bldg., Paterson, N. J. Mine office: Olalla, East Yale district, B. C. Robert Gaede, president; Joseph Bamford, Jr., vice-president; John E. Tylee, secretary and treasurer; A. A. Watson, general manager. Organized October, 1901, under laws of Maine, with capitalization $8,000,000, shares $25 par. Company controls the Similkameen & Keremeos Ry. Co., capitalized at $3,000,000. Annual meeting, second Tuesday in November.

Lands, about 50 crown-granted claims, area circa 2,500 acres, also a 100-acre mill and smelter-site, in the lower Similkameen and Keremeos camps, Osoyoos division, East Yale district, showing contact veins between diorite and felsite, ore bodies occurring in both, but mainly in the felsite. Veins, about a dozen in number, were claimed, by a former management, to range in width from 3′ to 500′ and were estimated to average about 5% copper, 2 to 5 oz. silver and $1 to $40 gold per ton, but this estimate, which was utterly unwarranted, has been revised to reasonable dimensions by the present management, which claims to be developing a vein averaging 7′ width, carrying auriferous chalcopyrite averaging 1% copper and $4 gold per ton. Gangue is spar, garnetite and magnetite. Development includes a 70′ shaft and tunnels a

200′ and 600′. Property has hand power only, and is 87 miles from 60 miles of which has steamer transportation. Presumable idle.

RICAN MINING CO. **UTAH.**

Provo, Utah. Mine office: Eureka, Juab Co., Utah. Jesse esident; J. William Knight, vice-president; R. E. Allen, secretary rer; preceding officers, Hon. O. W. Powers and Fred Schmidt, di- apitalization $125,000, shares 25 cents par. Property is the Ameri-

DY GOLD MINING & TUNNEL CO. **NEW MEXICO.**

office: Elizabethtown, Colfax Co., N. M. Has auriferous copper gasoline and electric power. Idle some years.

NY COPPER CO. **MICHIGAN.**

60 State St., Boston, Mass. Mine office: Calumet, Houghton Co., ploys 15 men. H. F. Fay, president; Geo. G. Endicott, secretary er; preceding officers, John C. Watson, Stephen R. Dow, Rogers L. nd Wm. Howell Reed, directors. Organized 1898, under laws of with capitalization $2,500,000, shares $25 par; $12 paid in. Old st Co., Boston, registrar. Annual meeting, second Wednesday in Company sold, circa 1906, its share of the Centennial mill, the herefrom obviating an assessment. Operating expenses for year . 1, 1908, were $22,237.40, leaving a cash balance on hand of

were circa 1,200 acres, in Sections 17 and 18, T. 56 N., R. 32 W., l adjoining the Calumet & Hecla, from which 40 acres of surface ection 18, were sold, 1905, to the Centennial, and the NE ¼ of the ot 3, Section 5, T. 56, were sold, 1907.

plete geological cross-section was secured, 1899-1901, by a tunnel n the Eastern Sandstone, 57° W. of N., for about 3,000′, at right ne strike of the formation, N. 33° E., and by diamond drill borings, Kearsarge amygdaloid eastward to the western end of the tunnel. ection shows upwards of 75 amygdaloidal and conglomerate beds, of which carried a little copper in the drill cores, and where cut el.

are 5 shafts, of the following depths: No. 1 is 700′; No. 2 is 250′; 0′; No. 4 is 400′; No. 5 is 200′. In July, 1906, a little chute of found in the crosscut west from No. 1 shaft, on the 700′ level, arrying calcite and epidote in considerable quantities. Late in ygdaloidal bed, discovered by the Mayflower several years pre- showing bunchy values on the ninth level. The Old Colony has ifferent results from a decade of underground development, all beds pper proving, so far, both narrow and bunchy.

NION CO. **ARIZONA.**

99 John St., New York, N. Y. Mine office: Globe, Gila Co., Ariz. s, president; Chas. Sumner Smith, vice-president; Chas. H. Alt- etary and treasurer; preceding officers, Cleveland H. Dodge, Jas. pley Amory, Chas. S. Lund and J. Waldo Smith, directors. Organ- 5, 1904, under laws of Maine, with capitalization $8,750,000, shares sued, $7,313,025. Company issued 12,000 shares circa April, 1907, st dividend, of 50 cents per share, was paid Dec. 15, 1905, and a $1 per share was paid Aug. 1, 1907.

npany is a securities holding corporation only, organized to promote n of the mines of the Old Dominion Copper Mining & Smelting Co. Globe Mines under a joint management, while technically comply- junctions restraining the merging of these two corporations. Prop- Old Dominion Co. is exclusively shares in the two subsidiary cor-

porations named, and the Old Dominion Co. is controlled by the United
Mines, owned by Phelps, Dodge & Co., the United Globe having given 1
shares of its stock, and $250,000 cash, for 138,000 shares of the Old Dom
Co. The Old Dominion Co. has exchanged its stock for shares of the
Dominion Copper Mining & Smelting Co., and owns nearly 95% of the sto
the Old Dominion Copper Mining & Smelting Co. The balance sheet, on De
1907, showed stock holdings, in subsidiary companies, of $6,981,125, with
and accounts receivable $564,066, with $200,000 floating indebtedness
$11,073 accounts payable, with cash and accounts receivable of $453,920.

The Old Dominion and United Globe mines are operated by the Old
minion Co. as entities, but with a free interchange, upon an equitable
of ores for smelting and fluxing. The Old Dominion Co. financed the flo
indebtedness of the Old Dominion Mining & Smelting Co., by means of a
The properties are described under the titles of their respective owners.

OLD DOMINION COPPER MINING & SMELTING CO. ARIZ

Office: 852-50 Congress St., Boston, Mass. Mine and works office: G
Gila Co., Ariz. Employs circa 2,500 men. Chas. Sumner Smith, president;
ceding officer, Geo. Napier Towle and Dr. Joseph T. Herrick, executive
mittee; preceding officers, Chas. T. Lund, E. F. Newton and G. Waldo S
directors; Chas. H. Altmiller, secretary and treasurer; Niles S. Berray,
eral superintendent; R. B. Hegardt, superintendent; Dr. L. D. Ricketts,
sulting engineer.

Organized July, 1895, under laws of New Jersey, with capitali
$5,000,000, shares $25 par; outstanding, $4,050,000. Is controlled, th
ownership of all but about 8,000 shares, standing in the name of some 25 mi
shareholders, by Old Dominion Co. Annual meeting, first Wednesday in

Paid, July, 1907, a dividend of $1.25 per share, amounting to $2
this being the first since 1895. Company formerly had a considerable fl
debt, which was taken up by the Old Dominion Co., and last of floating
$100,000, was paid, October, 1908. Earnings for 1907 were about
share, or circa $600,000. Balance sheet, of Dec. 31, 1907, showed quick
of $1,696,656, with floating debt and accounts payable of $1,329,848, lea
net balance of quick assets of $366,808. For 4 years, ending 1907, im
ments cost $1,875,647.

The company is engaged in extensive litigation with A. S. Bigelo
the Estate of Leonard Lewisohn, suing for recovery of promotion profits
litigation is extremely involved, being in the state courts of New Jers
Massachusetts, and also in the Federal courts, and has been further
cated by efforts of the New Jersey courts to restrain the company from
cuting suit against the promoters in the Massachusetts courts. On
1907, the company secured, in the Massachusetts court, a verdict for d
of $1,700,000.

Lands, 9 claims, 3 fractional, and a 10-acre millsite, at Globe, also
Dominion and Keystone claims, circa 3½ miles north of Globe, the Cont
group, 240 acres, the Chicago & New York group of 60 acres, and the
mine. Principal developments are on the property at Globe.

The principal ore zone occurs along a displacement having a no
and southwest strike, with sharp dip eastward. The hanging-wall is lim
and quartzite, with footwall of diabase of more recent age, faulting ev
occurring before and after the intrusion of the diabase. The ore fav
hanging-wall, occurring in lenses parallel to the bedding planes of th
stone and quartzite, the largest lense yet developed being circa 60x1
in size. The oxidized ores are mainly cuprite, associated with a little ma
and chrysocolla, in a gangue of iron oxides and quartz. Sulphide or
appear at a depth of about 350', the principal sulphide ore in the upper

ing chalcocite, with gangue of pyrite and quartz, the lower workings
chalcopyrite of 3 to 4% copper tenor. All ores are more or less ar-
rous, and, as a rule, are highly silicious, requiring heavy lime and iron
n smelting. The mine suffered severely from fire and flood, in 1906, and
wet, making circa 3,000,000 gallons of water daily Underground de-
nts are extensive, and during the greater part of 1908, new drifts were
at the rate of 2,000′ to 2,500′ monthly.

was thought, for years, that the ore was cut off in what is known
s the West Country, by a fault, but the extension has been located, and
uch promise. A dam across Pinal Creek was completed, November,
obviate the heavy seepage of water that has caused unduly high
charges in the past. Principal new developments are on the 10th
h levels, in the extreme eastern end of the mine, and on the 10th to
els, inclusive, at the western end. The ore body under Pinal Creek,
1905, shows oxidized ores, up to 20% in copper tenor, on the 8th,
10th levels, with chalcocite of even better copper tenor on the 11th
he property has suffered in the past from lack of sulphide ores, which
en bought extensively from small adjoining mines in the Globe dis-
d also have been imported from other mining fields in Arizona, Cali-
nd Mexico. The mine shows sulphides, of low average copper tenor,
4th, 15th and 16th levels, and these are to be developed extensively,
needed in the smelter.

mine has a pumping capacity of 6,000,000 gallons daily, with a
lon Prescott pump, on the 10th level, which has a 12″ water-column,
ng 30′ above the collar of the shaft, into a launder on a trestle lead-
storage tank, whence water is drawn for use of the mill and smelter.
old shafts of the mine suffered severely from crushes and creeping,
w shafts have been sunk, in the footwall. A shaft, on the western
Pinal Creek, in what is known as the West Country, has 5 compart-
perating two 3-deck cages and one 2-deck cage, and, November, 1908,
below the 14th level. Crosscuts from A shaft, of about 800′ length,
h, 9th and 10th levels, reach the West Country, and crosscuts will be
the 14th and 16th levels also.

aft, on the eastern side of Pinal Creek, has 4 compartments, and is
on the 14th level, with a big station on the 6th level.

aft is bottomed on the 8th level.

aft, on the western side of Pinal Creek, about 2,000′ west of the most
workings previously made, is to be sunk to the 14th or 1,000′ level.
Continental mine shows some high grade sulphide ores, and has con-
ore bodies assaying about 3% only in copper tenor.

ace equipment includes engine-houses and boiler-house of steel frames,
sides and roofs. There is a large and well equipped machine-shop,
a factor of prime importance, as the mine is located some hundreds
from the nearest large custom shops. Equipment includes a 30-drill
hoist, compound air-compressor with intercooler and water-jacketed
ers, and a complete electric light plant. The management has given
tion to the matter of a new electric power plant. Petroleum is used
y for fuel.

nine, mill and smelter are connected by a private railway having a
orter locomotive and 50-ton ore cars.

are graded and furnace charges prepared at the millsite, a short dis-
n the mine. The grading plant has 6 steel coarse ore bins, of 85 tons
ach. Ore is drawn from the various pockets onto trommels of man-
el, undersize dropping to an 18″ conveying belt, which carries it to
torage bins, while oversize goes to a 10x20″ crusher, and thence to

a 36" picking-belt, from which smelting ore is hand-picked, and resi
put through a 10x20" rock-breaker, and crushed to 2" size, the materi
the last crusher being taken, on an 18" belt, to the conveyor storage
200 tons capacity each. From the storage-bins ore is drawn automati
a conveying belt that takes it to the top of the mill, where ore is dis
into a mixing-box, and passed to revolving screens for classification.

The mill, of 300 tons daily capacity, is of structural steel, iron-s
standing on concrete foundations. Equipment includes 18 Frue vann
9 Wilfley tables. The plant is entirely automatic, and is one of the
existence, both in theory and in practice.

The smelter includes several buildings of structural steel on stone
tions. There are 8 double storage-bins, holding 1,000 tons of coke, li
and ore. Mixing, weighing and charging are done automatically, req
force of only 4 men. Equipment includes 6 blast-furnaces, each 44x180
tuyeres, set tandem, with common settlers between, charged auton
from side-dumping cars. The 6 furnaces give the smelter a normal
of about 2,400 tons daily, but one furnace is held in reserve. The
chamber is 20x20x250', connecting with a 200' smokestack, of 23' dia
the bottom and 14' at the top, set on a base 25' above the tuyeres. F
is briquetted for resmelting. Fuel is New Mexican coke, taken from t
son Coke Co., under a one-year contract, at $9.65 per ton, which compa
a former cost of $14.75 per ton for eastern coke, this saving reducing
finished copper about one-half cent per pound.

The converter department has 3 stands, with shells 84x132", linec
mixture of clay and quartzite carrying 4.5% copper, the linings a
about 75% silica, each lining making an average of 18 tons of blister
Shells are handled by a 40-ton electric traveling crane. The convert
50% matte and turn out blister copper of 99.5% copper tenor carryi
silver values. The converter slag-yard is 18x70', with a floor of 2" iro
laid on brick bedded in concrete.

The smelter power plant has two 200-h. p. and two 325-h. p. boile
ing petroleum. Furnace blast is supplied by Connersville blowers,
cubic feet aggregate capacity per minute, and converter blast is furn
a Nordberg air-compressor of 18,000 cubic feet per minute air capac
electric generator furnishes energy for the crane, lighting and tracti
being an electric locomotive and three 3,000-lb. tilting cars for charg
a steam locomotive and dump-cars for handling slags.

The smelter does considerable custom work, and is an extensive
of sulphide ores, which are necessary for fluxing the oxidized ores of
Dominion and United Globe mines. The amount of sulphide ore ava
the district is increasing rapidly, and the company also is develop
sulphide ore bodies in its own mines.

The old slag-dump is estimated to carry nearly 50,000,000 lbs. fin
ranging in tenor from 2 to 4% copper in the more modern slags, ma
the present management took charge, up to as high as 8% in the old
The slag-dump is being resmelted, gradually, with an average recovery
2% copper, the slags serving for flux, while their removal will give
room that they now occupy.

Production has been as follows: 28,919,217 lbs. fine copper
16,602,186 lbs. fine copper, 74,123 oz. silver and 1,798 oz. gold in 1906;
lbs. fine copper, 69,067 oz. silver and 2,407 oz. gold in 1907. Producti
ber, 1908, was 2,685,891 lbs. blister copper. Production is circa 35
of ore monthly, in addition to custom ore treated. Copper was being
a cost of about 11 cents per pound, at the end of 1908, with a pr
10-cent copper ultimately.

Old Dominion has been well handled, physically and financially, by nt management, despite numerous criticisms from shareholders clam- dividends. Much of the criticism has been ill advised, as the prop- been managed with a view to permanent rather than temporary ad- and the mine never was in as good shape physically, or the company , as at the end of 1908.

MINION DEVELOPMENT **BRITISH COLUMBIA.**
DICATE, LTD.

office: Kamloops, Yale district, B. C. Organized 1906, with capital- 5,000, shares $1 par. Lands, 3 claims, on Coal Hill, 6 miles south- amloops.

IA MINES CO. **UTAH.**

Provo, Utah. Mine office: Alta, Salt Lake Co., Utah. Organized , 1908, under laws of Utah, with capitalization $600,000, shares $1 . Martineau, president; Jesse Knight, vice-president; R. E. Miller, M. M. Miller, treasurer. Property is the Old Emma mine, in the onwood district.

IA MINING CO. **UTAH**

Provo, Utah. Mine office: Alta, Salt Lake Co., Utah. Jesse eneral manager. Company apparently has been succeeded by Old ies Co. Property is the Old Emma mine, which was a considerable early days.

RY COPPER CO. **MONTANA.**

office: Butte, Silver Bow Co., Mont. J. Benton Leggat, manager. Jan. 29, 1906, under laws of Maine, with capitalization $1,000,000. s a seven-eighths interest in the Old Glory mine, lying west of and the Mountain Consolidated mine of the Anaconda, and between the Snoozer claims of the Raven Copper Co., other eighth being owned Coalition Mining Co. Mine has a 1,200′ shaft, upper levels showing g small copper values and high gold and silver values, with an in- opper at depth. Mine, opened 1885, has raised a little ore occasion- 1903, through the Buffalo shaft of the Anaconda.

ERNORS COPPER MINING & SMELTING CO. **NEW MEXICO.**

215½ North Main St., Roswell, N. M. Mine office: San Marcial, , N. M. I. B. Rose, president; J. A. Cottingham, vice-president; B. ecretary and treasurer; H. Fitzgerald, general manager. Organized 1903, under laws of New Mexico, with capitalization $1,000,000, ar; issued, circa $700,000. Annual meeting, second Tuesday in May. 6 claims, area 120 acres, also a 5-acre millsite, in the Dripping trict, 25 miles from the Santa Fé railway, with a good wagon road showing 3 fissure veins in porphyry, of which one, of 18′ estimated pened by a 50′ tunnel and shafts of 30′, 50′ and 100′, showing mal- sulphide ore formerly said to assay 12% copper, 2 oz. silver and $8 n, and now claimed by company to average 25% copper and $3 n, which figures seem excessive. Idle.

ORY COPPER MINING CO. **NEW MEXICO.**

Absorbed, circa 1901, by Copper Chief Mining Co., later Sater, later ormerly at Clayton, Union Co., N. M.

DRED MINING CO. **COLORADO.**

43 Wall St., New York, N. Y. Mine office: Silverton, San Juan Howell Hinds, president; Thos. A. Nevins, vice-president; Thos. , secretary and treasurer; preceding officers, Wm. C. Eakins and eiser, directors; Robt. W. Davis, Jr., general manager; J. M. Elmer, ent. Organized June, 1906, under laws of Maine, with capitaliza- 000, *shares $5 par; issued, $4,500,000.* Company was stated, July,

1908, to have a floating indebtedness of $75,000. Stock was floated Nevins & Son, of New York, and then advanced, by manipulation, share, which was above any possible actual value.

Lands, 26 claims, patented, area circa 500 acres, on Galena M Cunningham Gulch, near the Silverton & Northern railway. Prop a quartz vein of 5′ to 12′ claimed width, carrying values in gold, and copper, with an increase in copper at depth, developed mainly and claimed to have upwards of 4 miles of workings.

Equipment includes a power building of steel and concrete, and electric plants. There also is a tramline, store and numerou

The mill, of steel frame, of 200 tons rated daily capacity, has plete equipment, including 40 stamps, crushers, rolls, jigs, Frue va tables and concentrating tables. Company is in bad condition fina is not regarded favorably.

OLD IMPERIAL MINING & MILLING CO.

Mine office: Cherry Creek, White Pine Co., Nev. P. H. Cann tendent. Has auriferous and argentiferous copper ores, employi men at last accounts.

OLD IRONSIDES MINING CO. **BRITISH C**

Dead. Was merged, March 29, 1901, in Granby Mining, Smelti Co., Ltd. Formerly at Phoenix, Boundary district, B. C.

OLD PUEBLO MINING & MILLING CO.

Mine office: Tucson, Pima Co., Ariz. Alexander Rossi, presi Roche, vice-president and general manager; W. P. Haynes, secretar urer. Capitalization $1,000,000, shares $1 par. Lands, 9 claims, west of Tucson, having about 600′ of workings, with a 70′ shaft t depth of 30′, a 15-ton pocket of chalcocite assaying 33% copper, and $2.50 gold per ton. Has several mine buildings. Arranged, Tucson Consolidated Copper Co., for latter to do $50,000 worth ment work, in exchange for 51% of the stock, to be turned over o of work. In October, 1907, made an initial shipment of ore, rangin copper and $5 to $10 combined gold and silver values per ton. E 20 men.

OLD RELIABLE MINING CO. **NE**

Mine office: Golden, Santa Fé Co., N. M. Ores carry gold Has two 5′ Huntington mills. Presumably idle.

OLD TIEWAUKEE MINING CO.

Office: care of Lewis A. Jeffs, president, Salt Lake City, office: Bingham Canyon, Salt Lake Co., Utah. Capitalization $50 $5 par. Lands include the old Tiewaukee mine, area 120 acres, a Winnimuck, supposed to carry the Caledonia vein at a depth o Deepest shaft is less than 100′, development being mainly by tun property has produced some good ore in the past. Company said the Yellow Creek property, area 90 acres, near the Hidden Fort the Black Hills district of South Dakota. Presumably idle.

OLD TOWN MINING & MILLING CO.

Mine office: Russell Gulch, Gilpin Co., Colo. Ores carry gol copper. Main shaft, 900′. Has steam and electric power. Presu

OLGA COPPER CO.

Letter returned unclaimed from former mine office, Luning Co., Nev. Property, near Luning, has shafts of 20′ to 60′ for 2,20 outcrop of a vein said to show ore averaging 8% copper, with son to 50% in tenor. Idle and apparently moribund.

OLIVE CAMP MINING CO.

Letter returned unclaimed from former office and mine, Tucso

iz. W. W. Wishon, general manager; John Ellis, vice-president; D. H. llins, superintendent. Lands, circa 12 miles south of Tucson, have a 55′ ft. Idle and apparently moribund.

SEPH OLIVER. **NEW MEXICO.**

Office and mine: Chloride, Sierra Co., N. M. Employs 4 men. Lands, 120 es, in the Apache district, showing 6 contact deposits, between limestone porphyry, of which 2, under development, of 40′ reported average width, said to be traceable 7 miles, carrying oxide, carbonate and sulphide ores copper, claimed to average 18% copper and 25 oz. silver per ton, which esti- es are too high. Mine is opened by shafts of 30′, 50′, 75′, 100′ and 110′, by a 200′ tunnel.

YMPIA MINING CO. OF WYOMING. **WYOMING.**

Office: 187 E. Chicago Ave., Chicago, Ills. Mine office: Encampment, bon Co., Wyo. Pehr W. Nillson, president; Herman C. Johnson, secretary; O. Borgquist, treasurer; John Lundgren, general manager. Idle and ap- ntly moribund.

YMPIC MINING CO. **WASHINGTON.**

Office: 301 Lumber Exchange, Seattle, Wash. E. R. Butterworth, presi- ; Alfred Jeffery, secretary. Company advertised stock on the installment , claiming that its lands contained gold, copper and coal, but secretary s that no copper property is being developed, and manifests a reticence ding the alleged properties of the company utterly at variance with the on-toned advertising done in the press. Location of lands, if any, un- n, and company regarded with suspicion.

HA COPPER MINING CO. **WYOMING.**

Office: 1017 New York Life Bldg., Omaha, Neb. Mine office: Encamp- , Carbon Co., Wyo. Jas. H. Kyner, secretary. Is a twin of the Blanche er Mining Co. Idle.

HA GOLD & COPPER MINING & SMELTING CO. **MONTANA.**

Dead. Formerly at Bigtimber, Sweetgrass Co., Mont.

KI MINE. **JAPAN.**

Mine office: Nishitate-mura, Kita-Akita-gori, Ugo, Japan. Mine was d circa A. D. 1750, and reopened 1885. Ore bodies are lenses in Tertiary and andesite. Largest lense is 70′ deep and 130′ long. Ore is argentite, iated with chalcopyrite, sphalerite and galena. Latest reported produc- 1896, was 242,690 lbs. fine copper and 858,316 momme fine silver. Idle years.

R MINING CO. **ALASKA.**

Office: Canterbury Bldg., Portland, Ore. Mine office: Kiam, Prince of s Island, Alaska. Chas. E. Ladd, president; W. A. Howe, vice-president; S. Wood, secretary and treasurer; W. W. Catlin, general manager; H. W. er, superintendent. Organized 1904, under laws of Oregon, and is oper- as a close corporation.

Lands, 6 claims, area 120 acres, 4 miles from tidewater, on McKenzie Inlet, elevation of 3,200′, held, on a long lease, from the Khayyam Copper Co. erty shows Kasaan greenstone and schists, latter in part dioritic, carrying allel ore zones, having lenticular ore bodies in schist, these ranging 4′ to width. Development is by tunnels of 140′, 240′ and 650′, with about a er-mile of workings, showing ore giving average assays of about 3% r, with small gold and silver values, and occasional zinc. Ore is mainly site, carrying small percentages of disseminated chalcopyrite, with more pyrite and pyrrhotite.

Equipment includes an aërial tram of 4,186′, and a surface tram of 12,160′, g at ore-bunkers upon a wharf on McKenzie Inlet. The old management over-enthusiastic, and built the tramway and wharf before a mine was

opened, and production, 1907, was only 2 carloads of ore. Prope cred promising.

OMEGA COPPER CO.

Office: Tucson, Ariz. Mine office: Vail, Pima Co., Ariz. L. president and treasurer; Capt. T. C. Roberts, vice-president an Frank H. Hereford, secretary. Organized May, 1906, under laws with capitalization $2,500,000, shares $10 par.

Lands, 2 claims and a smelter site, 16 miles from Vail, in t district, also sundry lode claims in the Tyndall district of Santa C Arizona. The Helvetia property was one of the first copper mi county, having shipped considerable carbonate ore in the past. Mi by a 150′ upper tunnel, and the 1,100′ Tilly tunnel having a back o with about one mile of workings. Main vein, of about 40′ ave carries carbonate and sulphide ores averaging 6 to 9% copper, wi and silver values, selected ore running up to 30% copper and 20 o ton. Suspended October, 1907, after shipping a little ore.

OMEGA MINING CO.

Dead. Lands sold, May, 1906, to Omega Copper Co. Forme Pima Co., Ariz.

OMODANI MINE.

Owned by Mitsu Bishi Goshi-Kwaisha.

OMORI MINE.

Mine office: Omori-mura, Nima-gori, Iwami, Japan. Propert mine, opened circa A. D. 1300, and reopened 1525. The mine once productive, but output was greatly reduced toward the end of the Century, and is again increasing. The Eikyu group carries mainl and argentiferous chalcopyrite, and the Hontani group carries m argentite, with some native silver.

Production has been as follows: 80,139 lbs. fine copper, 122 silver and 2,880 momme gold in 1900; 210,596 lbs. fine copper in 1 lbs. fine copper, 1,564,702 grams silver and 21,427 grams gold in 1 lbs. copper, 556,269 momme silver and 9,068 momme gold in 1907.

ONECO COPPER MINING CO.

Office: 64-50 State St., Boston, Mass. Mine office: Demmo Co., Mich. Wm. F. Fitzgerald, president; S. S. Millet, secretary an Jos. Hocking, superintendent. Organized 1899, under laws of Mi capitalization $2,500,000, shares $25 par; issued, $1,473,500. Levie ment of 50 cents per share, Jan. 15, 1906.

Lands, 800 acres, known originally as the Hungarian mine, the Fitzgerald. First work was done 1862, when a shaft was su 100′. Property was idle until 1899-1900, and a little work was 1906-1907. The mine has one shaft, of circa 500′ depth. Impr clude several mine buildings and dwellings. Fully described Vol.

ONEIDA GOLD & COPPER CO.

Dead. Formerly at Nogales, Santa Cruz Co., Ariz.

ONOKO MINES CO.

Office: 203 Kittredge Bldg., Denver, Colo. Letter returne from former mine office, Central City, Gilpin Co., Colo. Samue president; Edgar T. Butler, secretary and treasurer. Organized u Colorado, with capitalization $1,800,000, shares $1 par. Lands, 5 cl by a 229′ vertical shaft, showing a vein with a 12″ paystreak, values up to 11.95% copper, 3.91 oz. silver and 0.17 oz. gold. Idl ently moribund.

ONTARIO & CŒUR D'ALENE MINING CO.

Office: care of Fred Baier, agent, Saltese, Mont. Mine offi

, Idaho. Geo. Isle, president; M. N. Stratton, secretary and treas-
ng officers, Geo. M. Reasoner, J. A. Reinhart and Henry Billberg,
ands, 15 claims, near the East Snowstorm, on which work was
1906. Development is by a tunnel, planned to cut the vein at
pth.

COLORADO GOLD & MINING CO. — **COLORADO, ONTARIO & YUKON.**

ormerly at Central City, Gilpin Co., Colo. Described Vol. VI.

OPPER CO. — **ONTARIO.**

520 University Blk., Syracuse, N. Y. Mine office: El Dorado,
, Ont. Jas. B. Cook, president; Arthur Coe, mine manager; G. H.
erintendent. Property formerly was under lease to the Medina
Co., which seems to have gone under, and is the only copper
tern Ontario. Ore occurs in a contact deposit between limestone
showing hematite outcrops, succeeded at depth of circa 75', by
and a little high grade chalcocite, in a vein of 7' to 8' width,
Ontario Geological Survey to carry 4 to 10% copper, and esti-
mpany to average 7% copper, which probably is too high. Prop-
lly was an iron mine, from which considerable hematite was
iron ore proved to be merely a gossan. Mine, opened to depth
', has a 140' main shaft. Equipment includes an air-compressor
light plant.
is at the mine, a derrick hoisting ore from the mine dumps into
building. Smelter, blown in June 25, 1906, and since run at inter-
ot being sufficiently developed to supply ore steadily, has a 48"
r-jacket blast-furnace, of 50 tons rated capacity, making a 45%
fusions. Was said, 1907, to be producing 30 to 35 tons of ore
have shipped some matte to the DeLamar works in New Jersey.
ompany has same officers as the Medina Gold Mining Co., which
ds while peddling stock, and which came to grief. Property con-
ising, but company not regarded favorably.

EVELOPMENT CO. — **ONTARIO.**

care of Frank Howard, Munising, Mich. M. J. Morrisey, secre-
easurer. Organized under laws of Ontario, with capitalization
ands, 320 acres, 40 miles north of Sault Ste. Marie, Ontario, and
f Goulais Bay, opened by 14 shallow pits, deepest 24', showing
f ore, with quartz gangue, giving good assays in copper. Idle.

OLD & COPPER MINING CO. — **ARIZONA.**

Formerly at Prescott, Yavapai Co., Ariz.

ICKEL CO., LTD. — **ONTARIO.**

ice: Worthington, Algoma, Ont. G. E. McGinley, president; W.
nager. Organized Oct. 5, 1906, under laws of Ontario, with capi-
,000,000, succeeding the Canada Nickel Co. Property is the Totten
lf mile west of Worthington, having a 90' shaft. Is said to use
s for the recovery of nickel.

MELTING CO. — **ONTARIO.**

Formerly at Massey Station, Algoma, Ont.

INE. — **CAPE COLONY.**

by Cape Copper Co., Ltd.

D MINING & MILLING CO. — **WASHINGTON.**

ice: Chesaw, Okanogan Co., Wash. Ores carry gold, silver and
s steam power. Idle.

SOLIDATED MINES CO. — **UTAH.**

Provo, Utah. Mine office: Eureka, Juab Co., Utah. Jesse Knight,
lmer R. Jones, vice-president; R. E. Allen, secretary; M. H. Walk-

er, treasurer; Frank P. Swindler, general manager; preceding officers, Mangum, Amanda M. Knight, Lafayette Hanchett and Geo. T. Odell. Organized October, 1908, under laws of Utah, with capitalization shares $1 par.

OPHIR CONSOLIDATED GOLD & COPPER MINING CO.

Dead. Formerly at Florence, Pinal Co., Ariz. Described Vol.

OPHIR CONSOLIDATED MINES CO.

Office: Madison, Wis. Mine office: Ames, San Miguel Co., C Ladd, general manager; F. E. Trumble, superintendent. Mine, kn Silver Bell, has gold, silver and copper ores, of importance in the copper being merely a by-product. Has hydro-electric power, with mill, employing circa 60 men.

OPHIR COPPER MINING CO.

Dead. Lands sold, 1906, to Butte Central & Boston Copper Formerly at Butte, Silver Bow Co., Mont. Fully described Vol. V

OPHIR GOLD & COPPER MINING CO.

Office: Spokane, Wash. Mine office: Helena, Lewis & Clark Capitalization $1,000,000. Lands, in the Blackfoot district, near H a fissure vein carrying copper ore of fair assay tenor.

OPHIR HILL CONSOLIDATED MINING CO.

Mine office: Ophir, Tooele Co., Utah. E. W. Clarke, superinten carry gold, silver, lead, copper and zinc, with values mainly in silv Has water, steam and electric power, and a 150-ton concentrator. by Hon. W. A. Clark, and is operated as a close corporation, but posedly profitable. Litigation over land titles was settled favora pany, February, 1908. Was producing on leases about half nor early 1908.

OPHIR MINING CO.

Dead. Formerly at Butte, Silver Bow Co., Mont.

OPHIR MINING & DEVELOPING CO.

Dead. Formerly at Butte, Silver Bow Co., Mont.

OPHIR QUEEN MINING CO.

Office: Cedar River, Mich. Letter returned unclaimed from office, Ophir, Tooele Co., Utah. Samuel Crawford, secretary, tr general manager. Organized Apr. 19, 1902, under laws of Utah, ization $250,000, shares 25 cents par. Lands, 4 claims, area 53 a Ophir district, showing a 25′ vein, giving assays up to 12% coppe 15% zinc, 16 oz. silver and 40 cents gold per ton, opened by a 335 two 5x8′ compartments, and 3 tunnels, longest 220′ and 225′. Ha gasoline hoist, 3-drill Rand air-compressor and power drills. Idle ably moribund.

OPTIMO GOLD & COPPER MINING CO.

Office: Missoula, Mont. Mine office: Saltese, Missoula Co., Heidenreich, manager. Organized 1904, under laws of Montana, ization $1,500,000, shares $1 par. Idle several years.

OQUIRRH-BINGHAM COPPER CO. **UTAH &**

Dead. Formerly at Bingham Canyon, Salt Lake Co., Utah. Vol. VI.

ORANGE BLOSSOM MINING & MILLING CO. **CA**

Office: San Diego, Cal. Mine office: Bagdad, San Bernardi Jas. A. Hodgson, president; J. M. Dodge, vice-president; Will H secretary; R. V. Dodge, treasurer. Organized circa January, 190 italization $2,000,000, shares $1 par. Lands, 25 claims, including mine, and a millsite, circa 10 miles north of Bagdad, having a t 650′ shaft showing auriferous copper ore. Has 8 miles of 4″ and

ter from springs having a flow of about 60,000 gallons daily. Has ine buildings, and was building a 20-stamp mill, at last accounts. an an electric power installation for mine and mill. Employs circa

LAINS COPPER MINING CO. **AUSTRALIA.**
ice: Dandaloo, N. S. W., Australia. Property, in the vicinity of iver mine, shows ore of good assay tenor.

IVER SYNDICATE. **ORANGE RIVER COLONY.**
ice: Upington, Orange River Colony. Is said to have developed arly 1908.

A MINING CO. **MEXICO.**
ice: Valardeña, Cuencamé, Durango, Mex. Has auriferous and copper ores, with steam power and a 25-ton mill, employing

IZONA COPPER CO. **ARIZONA.**
ice: Superior, Pinal Co., Ariz. Lands are 2 miles south of as steam power.

ARIZONA MINING CO. **ARIZONA.**
eturned unclaimed from former mine office, Old Glory, Santa iz. Lands, known as the Black Diamond group, 2 miles from line, are said to carry a vein up to 30′ in width. Idle and noribund.

PPER CO. **OREGON.**
Formerly had an office in Spokane, Wash., and presumably was sephine county, Oregon.

LD & COPPER CO. **OREGON.**
Formerly at Sumpter, Baker Co., Ore.

OMESTEAD MINING & REDUCTION CO. **OREGON.**
care of C. J. Allen, president, Portland, Ore. Mine office: Galice, ., Ore. Frank B. Roberts, vice-president and general manager; secretary and treasurer. Organized, 1904, to take over the Allen mine, on Rogue river, 3½ miles south of Galice creek, Josephine on, at a reported consideration of $750,000. Apparently no work

AHO INVESTMENT CO. **OREGON.**
ice: Sparta, Baker Co., Ore. Jas. A. Howard, manager. Lands Poorman and Iron Mask claims, showing a heavy gossan. A 120′ uel is said to be entirely in ore, giving average assays of about with small gold and silver values.

E REDUCTION WORKS. **OREGON.**
Was a fake. Formerly at Portland, Multnomah Co., Ore.

IORT LINE MINING CO **NEVADA.**
Sold lands to Bristol Consolidated Mines Co. Formerly at Pioche, Nev.

MELTING & REFINING CO. **OREGON.**
Postal Telegraph Bldg., New York, N. Y. Works office: Sumpter, Ore. Walter E. Lindsay, president; G. F. Holmes, vice-president; bols, secretary; E. J. Lindsey, treasurer; Fred D. Fuller, general receeding officers; Scott German and Jas. H. Caldwell, directors; superintendent. Organized March 16, 1902, under laws of Arizona, ization $600,000, shares $10 par.
nclude a 200-acre smelter site, a 640-acre timber tract and 40 cellaneous lands. Company was said, 1905, to have taken a bond a sulphide copper property in the Seven Devils district, circa 20 Weiser, Washington Co., Idaho.

The smelter, at Sumpter, of 150 tons nominal daily capacity, has a 33x37 sampling mill, 16x86′ ore-bins, 46x88′ furnace building, 32x66′ briquetting plant, 46x77′ boiler-house and 32x52′ laboratory. The cupola building has a 38x144″ Allis-Chalmers blast-furnace, making matte, formerly estimated by company to average 40% copper, 300 oz. silver and $150 gold per ton, but actually averaging only about 15 to 40% copper, with an average of 60 oz. silver and $200 gold per ton, sent for refining to the Tacoma smelter. Fuel is wood, costing $2.50 per cord; soft coal, costing $8 per ton, and coke costing $8 per ton. In 1905 the smelter treated 8,798 tons of custom ore, making therefrom 174,758 lbs. fine copper, with considerable gold and silver values. The supply of custom ore available is insufficient to keep the plant running at its full capacity. The company was in financial difficulties, February, 1908, but these are said to have been settled April, 1908, and at last accounts resumption was planned.

ORE KNOB COPPER CO. CAROLINA.

Dead. Property was sold, circa 1885. Formerly at Jefferson, Ashe Co., N. C.

ORE KNOB MINE. NORTH CAROLINA.

Office: Ellicott Square Bldg., Buffalo, N. Y. Mine office: Jefferson, Ashe Co., N. C. Capt. John Bent, superintendent. Mine, opened previous to 18[illegible] and closed 1885, is said to have yielded, 1874, net profits of $60,302. Property shows a fissure vein of 6′ to 20′ width, of nearly vertical dip, in micaceous granite and mica-schist, carrying mainly high grade sulphides, claimed to average 12 to 20% copper, which is an overestimate. Development is by shafts, deepest 400′. The smelter, built 1902, has a 150-ton Garretson pyritic furnace. Idle since 1905.

ORE KNOB MINING CO. NORTH CAROLINA.

Dead. Formerly at Jefferson, Ashe Co., N. C. Described Vol. V.

ORFORD COPPER CO. NEW JERSEY.

Office: 43 Exchange Pl., New York, N. Y. Works office: Bayonne, Hudson Co., N. J. Robert R. Moffett, superintendent; E. Franki, chief engineer. Is controlled by the International Nickel Co. and refines nickel mattes and ores from New Caledonia and nickel-copper matte from Canada, in addition to treating copper ores and mattes from the United States, Canada, Mexico and elsewhere. Capacity of plant is about 8,000,000 lbs. copper and 1,000,000 lbs. metallic nickel, monthly. Works are exceptionally well equipped, and company enjoys a deservedly high reputation for metallurgical ability, and the fine quality of its metallic products.

ORIENTAL COPPER CO. ARIZONA.

Office: 303 Security Bldg., St. Louis, Mo. Mine office: Cave Creek, Maricopa Co., Ariz. W. F. McDonald, president; John B. Cabanne, vice-president; F. W. Irland, secretary and treasurer; preceding officers, H. [illegible] Townsend, W. C. Stith, S. B. Schuyler, C. A. Deane, E. B. Lane and H. [illegible] Berkley, directors; A. S. Mills, superintendent. Organized, 1904, under laws of Arizona, with capitalization $2,000,000, shares $1 par.

Lands, 19 claims and a 5-acre millsite, area 385 acres, having a 475′ tunnel, said to crosscut a number of veins showing ores that have given assays of 8.9% copper and 6.8 oz. silver per ton, with occasional small gold values. Management claims many carloads could be shipped, but that such shipments would be inadvisable. Tunnel is in schist, and ore found must have been from small stringers. Property poorly developed and not regarded favorably.

ORIENTAL MINING & MILLING CO. ARIZONA.

Office: Jamestown, N. Y. Mine office: Providence, Yavapai Co., Ariz. A. F. Kent, president; W. A. Keeler, secretary; Wm. A. Kent, assistant treasurer; L. B. Kent, superintendent. Is primarily a gold and silver mine, [illegible] ing a small percentage of copper. Has a 20-stamp mill, employing circa 25 [illegible]

GOLD MINING CO. **WASHINGTON.**
office: Bossburg, Stevens Co., Wash. Ores carry gold and copper.
power. Idle several years.

L BLUE BIRD COPPER MINING CO. **CALIFORNIA.**
office: Oasis, Mono Co., Cal. Capitalization $1,500,000, shares $1
, circa 2 miles south of Oasis, having shafts of 80′ and 130′, made
circa 1865, of high grade ore, ranging up to 250 oz. silver per ton,
med to have, on an old dump, several hundred tons of ore averaging
r, 35 oz. silver and $2 to $12 gold per ton. Formerly had a mill.

L CONSOLIDATED MINING CO. **MONTANA.**
and mine: Miner Bldg., Butte, Silver Bow Co., Mont. Employs
Hon. Wm. A. Clark, president; Arthur H. Wethey, vice-president
l manager; W. M. Bickford, secretary; Thos. Bryant, superintendent;
ie, assistant superintendent. Organized Feb. 20, 1904, under laws
gton, with capitalization $10,000,000, shares $100 par, as successor
l Mining Co.
include the Original, West Stewart, East Stewart, Dives, Home,
nd other adjoining properties, the Original and West Stewart, both
tional claims, being the principal producers. The mines are con-
lerground with adjoining properties.
riginal mine has a 2,200′ two-compartment shaft, which was
d and retimbered, early 1908, this shaft having a 126′ steel gallows-
a 36x72" first-motion duplex hoist, good for circa 2,600′ depth.
est Stewart mine has a 1,900′ vertical shaft, showing, at the bottom,
ielding considerable ore assaying up to 10% copper, with fair silver
h ore of better grade in the bottom levels than above. The West
s a 120′ steel gallows-frame, with a hoist duplicating that at the

ent includes 4 steam air-compressors and 2 Ingersoll-Sergeant
-compressors, each of latter being driven by a 200-h. p. induction

e of the Original company is treated at the Butte Reduction Works,
ame ownership, located circa 1½ miles south of the mine, ore being
, at night, over the line of the Butte Electric Railway Co.
tion normally is circa 18,000,000 lbs. fine copper yearly, but, for
nly 12,500,000 lbs., owing to depression in the metal market during
half of year. For year ending June 1, 1907, ore extracted was
s, yielding $9.31 per ton gross, with cost of extraction $4.08 per
t earnings were $663,259. The property, despite its small area, is
tive and valuable, and is well managed in all departments.

L MINING CO. **MONTANA.**
Succeeded, Feb. 20, 1904, by Original Consolidated Mining Co.
Butte, Silver Bow Co., Mont.

L YERINGTON COPPER CO. **NEVADA.**
ffice: Yerington, Lyon Co., Nev. Organized, 1907, under laws of
ith capitalization $1,000,000.

OPPER MINING CO. **WYOMING.**
Douglas, Wyo. Mine office: Clarence, Converse Co., Wyo. Hon.
k, president; T. H. Howard, vice-president; E. J. Wells, secretary,
nd general manager; Chas. J. Wells, superintendent. Organized
r laws of Wyoming, with capitalization $750,000, shares $1 par.
4 claims, area 80 acres, in the War Bonnet district, carrying an
ein in granite, opened by shafts of 75′ and 255′, showing carbonate
g about 6% copper, with traces of gold and silver. Has a 40-h. p.
t, with Inlet and 2-drill Leyner air-compressor. Presumably idle.

ORIOLE MINING & MILLING CO. WASHINGT

Mine office: Metaline, Stevens Co., Wash. Has secured ores assay well in lead, copper and silver.

ORION MINING CO. NEW MEXI

Office: P. O. Box 12, El Paso, Tex. Mine office: Lordsburg, Grant N. M. A. W. Gifford, manager. Organized 1898, under laws of New Mex with capitalization $200,000, shares $1 par. Property is the Dundee mine the Shakespeare district, Grant county, New Mexico, having about 1,000 underground openings, claimed to show 10,000 tons of ore, with quartz gan carrying $12 to $14 per ton in gold, silver and copper, which must be centrated to afford a profit. Company also owns claims in the Jarilla dist of Otero county, New Mexico. Apparently idle for some years.

COMPAÑIA DE MINAS EL ORITO. CHI

Office: Valparaiso, Chile. Mine office: Vallenar, Atacama, Chile. Or ized July 19, 1904, under laws of Chile, with capitalization £50,000, share par. Property is Las Breas mines, opened 1888. Preceding company w considerable producer, making upwards of 1,000,000 lbs. fine copper yearly.

SOCIEDAD MINERA EL ORITO. CHI

Dead. Was succeeded, July 19, 1904, by Compañía de Minas El O Formerly at Vallenar, Atacama, Chile. Described Vol. V.

ORKLA GRUBE AKTIEBOLOG. NORW

Norwegian incorporation of Orkla Mining Co., Ltd.

ORKLA MINING CO., LTD. NORW

Office: 61 Gracechurch St., London, E. C., Eng. Norwegian of Thamshavn, Trondhjem, Norway. Mine office: Lökken Vaerk, Meld Trondhjem, Norway. Thos. Fearnley, chairman; Consul-General Chris Thams, general manager; preceding officers, P. M. Wikström, Thv. Olrog, M Wallenberg, Consul-General Jacob Finne and J. M. Berner, directors. Or ized Dec. 7, 1904, under laws of Norway, with title Orkla Grube Aktieb with capitalization kr. 4,140,000, shares 180 kr. par. Controls a subsid railway and power company.

Lands, 120 claims, including mining, timber and miscellaneous l area 2,500 acres, in the Meldal and Orkedal valleys, Sondre Trondh Principal properties are the Lökken, Höidal and Dragset mines, carryi main ore zones, the southern running from the Dragset, through the Lö and Höidal, to the Aamot mines, in the southeast, a distance of about 9 m The southern zone runs from the Holum mine to various ore deposits in Grefstadfjeld, in the east, a distance of about 6 miles. Ore occurs in v and lenses in a brecciated schistose diorite country rock of Silurian age, being disseminated chalcopyrite and cupriferous pyrite.

The Lökken mine, opened A. D. 1657, has a 200′ upper shaft and incline shaft, with double hoist for ore and double hoist for men, and a tunnel, showing considerable ore bodies.

The Höidal, opened A. D. 1680, includes the Nya Höidal and Gamla Hö mines, principal openings being tunnels of 200′ and 500′.

The Dragset mine has shafts of 200′ and 300′, and a 100′ tunnel.

The Aamot and Kong Karl mines have 100′ tunnels each, and the toria mine, opened circa 1870, also has comparatively slight develop The Holum mine, recently opened, consists of 3 parallel ore bodies, of 3′ t width, traced for distance of about 160′.

The main dressing plant is at the Lökken mine, where the mining equ ment includes two 20-h. p. Ingersoll-Rand compressors. There is a 5-t Elmore experimental mill, and a large mill with 11 Elmore units, rated *800 tons* daily capacity, being the largest copper concentrating plant in Sc *dinavia*. Ore is brought to this mill by aerial trams of 8.4 kilometers fr

set mine, and 2.7 kilometers from the Höidal mine. Electric power
at 30 kilometers from the Skjaenaldfos waterfall station, at 15,000
a 3-phase alternating current, about 2,000 h. p. being utilized.
lings at the property include 6 dwellings for officers, 40 dwellings for
, compressor house, machine shop, transformer station, administration
warehouses, stores, hotel, etc., with a total of about 20 miscellaneous
. Company has its own postoffice and telegraph office, by arrange-
h the Norwegian government.
absidiary company, organized for the purpose, has installed a fine
ant at the Skjaenaldfos waterfall, and has built an electric railroad
6 kilometers for transporting ore from the Lökken mill to Thamshavn,
outh of the river Orkla, in the Orkedalsfjord, where the company
wharves for goods and passenger traffic, and automatic loading de-
the dispatch of ore. The transportation company, which has the official
Chr. Saldeson & Chr. Tham's Communication Aktieselskab, has a
making 2 round trips daily between Thamshavn and Trondhjem.
plans of the company, which has a strong and ambitious management,
the export of circa 100,000 tons of pyrite and cupriferous pyrite, be-
with 1909.

BRA MINING CO. **ARIZONA.**

e: 715 High St., Burlington, Iowa. Mine office: Wendendale, Yuma
z. Thos. Wilkinson, president and general manager; Hon. John J.
, vice-president; S. M. Wilkinson, secretary. Organized October, 1901,
ws of Arizona, with capitalization $1,500,000, shares $1 par; issued,

ds, 10 claims, area 200 acres, adjoining the Harcúvar Copper Co., in
worth district, 12 miles west of Wendendale, showing country rocks
e, granite, and porphyry, carrying several fissure veins in diorite and
, these ranging from a few inches to 20′ in width, showing oxide
bonate surface ores giving assays of 12 to 15% copper and $1.50 to
bined gold and silver values per ton. Development is by shafts of
and 100′, and by a tunnel of 175′. Presumably idle.

BRE MINING CO. **ARIZONA.**

ce: care of Geo. Duffy, Globe, Ariz. Organized Oct. 12, 1906, under
Arizona, with capitalization $300,000, shares $1 par. Presumably idle.

NSOLIDATED MINING CO. **ARIZONA.**

ce: care of R. M. Reid, secretary, Colorado Springs, Colo. Mine
Prescott, Yavapai Co., Ariz. H. I. Read, president; O. P. Hopkins,
r. Lands, 5 claims, patented, area 100 acres, in the Mineral Point
, 2 to 4 miles from two railroads. Ore values apparently are mainly
and company claims to have developed 7,000 tons of ore, worth $9 to
r ton, which is doubted. Idle.

ENORO MINES, LTD. **BRITISH COLUMBIA.**

ad. Succeeded by Denoro Mines, Ltd. Formerly at Rossland, Trail
, B. C. Fully described Vol. V.

RANDE MINES CO. **ARIZONA.**

tter returned unclaimed from former office, 1034 Park Row Bldg., New
N. Y. Mine office: Wickenburg, Maricopa Co., Ariz. Geo. B. Upton,
tendent. Mine has upwards of 3,300′ of openings, showing a large
dy, considerably mixed with country rock. Has gasoline power and
amp mill. Property well regarded, but management not.

RANDE MINING CO. **ARIZONA.**

ice and mine: Globe, Gila Co., Ariz. Lands, on Upper Mineral Creek,
110′ shaft, showing a 5′ vein giving ore assaying up to 5% copper,
ilver and 1.5 *oz. gold per ton. Presumably* idle.

OROGRANDE SMELTER. NEW ME

Owned by Southwest Smelting & Refining Co.

ORO MAXIMO MINING CO. ME

Office: Detroit, Mich. Mine office: Bacoachi, Arizpe, Sonora, N. L. Clancey, secretary and superintendent. Has 600,000 shares.

Lands, circa 1,000 acres, about 40 miles from La Cananea, the r railroad point. The mine is opened by a 275′ two-compartment shaft 300′ three-compartment shaft, with considerable development. Equipm cludes 2 hoists and a 12-drill Rand air-compressor. Water is supplie 2-mile pipeline. At last accounts company planned a 60-stamp mill. Pr which is considered promising, was attached, circa September, 1908.

COMPAÑIA DE ORO y PLATA, S. A. ME

Is the Mexican incorporation of the Carman Consolidated Copper C

ORO PLATA MINING & DEVELOPMENT CO. MON

Dead. G. W. Simpkins was president and general manager; G. H. first vice-president; N. M. MacLeod, second vice-president and secret G. Laurence, treasurer. Lands, near the Copper Chief, were said to s vein of 4′ to 5′ width, carrying auriferous copper ore. Former office w Hyde Block, Spokane, Wash. Formerly at Dillon, Beaverhead Co., Mon

ORO QUAY GOLD MINING & REDUCTION CO. COLO

Mine office: Ortiz, Conejos Co., Colo. Lands, 12 miles south of show considerable bodies of magnetic iron ore, some of which carri assay values in copper, silver and gold. Was under development, 19 Colorado Fuel and Iron Co., under lease.

FRANCISCO RODRÍGUEZ OROZCO y CA. ME

Office and mine: Mazapil, Zacatecas, Mex. Property is 23 min cluding the Todos Santos and La Nieva, developed by a 175′ main shaf a 1,000′ main working tunnel. Ores carry copper, lead, silver and gold Equipment includes a 75-ton mill and a 75-ton smelter. Employs circa 20

ORPHAN COPPER CO. ARI

Office: 1 West 34th St., New York, N. Y. Mine office: Globe, Gi Ariz. Melville D. Chapman, president; Chas. M. Clark, vice-presider general manager; preceding officers, P. P. Greer, A. J. Smith, Frank feller, Ezra B. Hamilton, Chas. T. Martin and G. B. Fox, directors; Wa Dunlap, secretary and treasurer. Organized May 15, 1908, under la Arizona, with capitalization $3,000,000, shares $5 par.

Lands, 10 claims, 1 fractional, area 190 acres, southeast of the Ke and near the Miami, 6 miles southwest of Globe, the nearest railway Property is said to show 9 main vein systems and a prominent fault, th cipal ore body under development occurring at the contact of schis granite-porphyry, this being estimated by company to average 30″ to width, and to be traceable 1,000′, carrying bornite, chalcopyrite and t arite, estimated to average 5 to 9% in copper tenor. The company p sinking 500′ shafts on both the Orphan and Iron Lode claims, 600′ apar connecting by a crosscut on the 500′ level, but only one shaft, of 230′ has been sunk, this showing a 30″ vein carrying mainly chalcopyrite, as up to 20% copper, with gangue of limestone and calcspar. The property ore of good assay tenor in shallow workings.

Improvements include a 20x22′ machine shop, carpenter shop, s assay office, warehouse and foreman's dwelling. Connection by Globe t a good wagon-road. Equipment includes a steam hoist and air-comp bought of the Calumet & Globe Development Co.

The company did not finish making its first payment until Aug. 1, one month after due. The company is in bad odor with careful inve because of the methods used in booming its shares, and the men con

this work. Mr. Frank Rockefeller, one of the directors, a brother of D. Rockefeller, was accused of dumping considerable stock, in violation agreement, and there was talk of a suit against Mr. Rockefeller, but ently this was merely a bluff. It has been asserted, in the press, that lockefeller's stock was donated, for the use of his name, and that the ny refused to transfer his certificates, when presented. The stock was ed in Boston by Cardenio F. King, a notorious personage who succeeded, anipulation, in getting the stock to $8 per share, but, late in September, the stock opened on the Boston curb at 8⅝ on Monday, and closed day at 1½ bid. Mr. King, who is under indictment for larceny, is said ie company to have no official connection therewith, but to have been ing the shares for a few shareholders, which may or may not have been ase. The property is considered as of some promise, but the methods romotion and financing are much disliked.

EGA MINING CO., S. A. **MEXICO.**

Is the Mexican incorporation of the Southwestern Mining Co.

ILLE GOLD & COPPER MINING CO. **BRITISH COLUMBIA.**

Mine office: Golden, Kootenay district, B. C. Idle for some years.

KA ELECTROLYTIC REFINING CO. **JAPAN.**

Office and works: Osaka, Izumi, Japan.

RUZAWA MINE. **JAPAN.**

Owned by Mitsu Bishi Goshi-Kwaisha.

ORN CONSOLIDATED MINING & MILLING CO. **UTAH.**

Mine office: American Fork, Utah Co., Utah. S. Osborn, superintendent. ds, 8 claims, west of the Pacific Mining Co.

EOLA CONSOLIDATED MINING CO. **MICHIGAN.**

Office: 303-199 Washington St., Boston, Mass. Operating office: Hough- Mich. Mine office: Opechee, Houghton Co., Mich. Employs 1,500 men. ert S. Bigelow, president; Hon. Norman W. Haire, vice-president and gen- manager; Wm. J. Ladd, secretary and treasurer; preceding officers, J. y Brooks, Edw. S. Grew, Edw. R. Hall and Walter A. S. Chrimes, directors. J. Uren, general superintendent; Frank H. Haller, assistant superintend- A. L. Burgan, mill superintendent; A. G. Gullberg, superintendent motive r; Chas. D. Hohl, chief engineer; Jas. Rowe, mining captain Osceola h; Jos. Biscombe, mining captain North Kearsarge branch; Frank Lan- mining captain South Kearsarge branch; John T. Reeder, purchasing t; Wm. Veale, clerk; Thos. Burgan, assistant clerk.

Organized 1873, under laws of Michigan, and reincorporated, 1903, for d of 30 years, with capitalization $2,500,000, shares $25 par; issued, 3,750. Shares are listed on the Boston stock exchange. Annual meeting, d Thursday in March.

Dividends, begun 1878, were $7,612,550 to end of 1908, recent dividends as follows: $2 in 1904; $6 in 1905; $13 in 1907; $6 in 1908.

Lands, 2,120 acres, in 4 separate tracts, also an extensive millsite, in ghton county, and considerable holdings of timber and miscellaneous in Houghton and Keweenaw counties, Michigan. Company's property des 4 mines, known as the Osceola, North Kearsarge, South Kearsarge and rack Junior, the latter being idle. The various mines employ about 150 r drills.

New openings, 1907, were as follows: 4,024′ in the Osceola branch; 18,532′ e North Kearsarge branch; 635′ in the South Kearsarge branch. Cost of penings is charged direct to operating expenses, which is the correct plan. e is comparatively little rock *selection*, though discrimination is used, ourse, in *breaking ground*. *The amount of* rock broken that was rejected

on surface was 9% in 1904; 12% in 1905, and 9% in 1907. The matter of power haulage has been given tentative consideration.

The Osceola mine proper was opened, 1873, on the southern extension of the Calumet conglomerate, upon which 6 shallow shafts were sunk, but this bed proved unremunerative, except under a few acres, and work was abandoned thereon and development begun on the Osceola amygdaloidal bed, lying parallel with and 730′ east of the Calumet conglomerate, at surface. The Osceola mine proper, area 720 acres, lying next south of the Calumet & Hecla mine, has 6 shafts on the Osceola amygdaloid, which has a strike of approximately N. 39° E., shafts being numbered from north to south. Crosscuts have been sent from the Osceola workings to the Calumet conglomerate, at various depths, without encouragement, and diamond drilling was done, 1904, to locate and test the Kearsarge amygdaloid on the old Osceola tract, but the results presumably were not encouraging. The Osceola mine proper uses 50 power drills.

Nos. 1 and 2 Osceola shafts have been abandoned for some years, owing to exhaustion of mineral ground tributary thereto.

No. 3 Osceola shaft, with 3 compartments, circa 3,000′ deep, has been idle for some years, and is practically abandoned.

No. 4 Osceola shaft, 600′ next south of No. 3, with 3 compartments, is circa 3,700′ deep, and has been idle for several years. There is small likelihood of shafts 3 and 4 being reopened, as the ground tributary to them is nearly exhausted, and the good stopes remaining can be reached from the shaft next south.

No. 5 Osceola shaft, 1,300′ south of No. 3, was 4,360′ deep on Aug. 1, 1908, and was cut down and retimbered throughout, in 1903.

No. 6 Osceola, formerly known as the Opechee shaft, is 1,300′ next south of No. 5, and was 4,423′ deep on Aug. 1, 1908. This shaft shows some excellent stopes, especially in the southern drifts, toward the Tecumseh line, in the lower levels. This shaft was retimbered with concrete between the 43d and 44th levels, and partly retimbered with wood above, in 1907. There is room on the company's lands for one additional shaft south of No. 6, if desired, but it is probable that the ground will be mined through No. 6, instead of by a new shaft.

The shops of the Osceola, formerly scattered along the line of shafts, have been centered between shafts 5 and 6. The new boiler plant at No. 6 has 5 Burt locomotive firebox boilers, with a coal-trestle and bin, and a 125′ brick-lined self-supporting steel smokestack, of 7′ inside diameter, standing on a sandstone base. The old boiler-house at No. 6, with stone walls and steel roof, has been lengthened 30′, and made into a compressor-house, equipped with a 50-drill Nordberg 2-stage cross-compound air-compressor, having 36″ and 40″ air cylinders, and steam cylinders of 22″ and 42″, with 48″ stroke. A new boiler-house has been built to the north of the old structure.

A new combination smithy and machine shop, between shafts 5 and 6, is 60x144′, in 2 sections, with brick walls and steel truss roof, covered with corrugated steel. Electric power is used.

A new electric plant, complete 1907, located in the compressor-house, has a 100-kw. 220-volt direct-connected generator, delivering a direct current, and also furnishes electric light for the Osceola mine and location, using direct current enclosed arc lamps.

In addition to the mine buildings, the Osceola location has a large number of dwellings for workmen. Water is secured from Lake Superior through a 6″ pipe line, of 1½ miles length, connecting with the stand-pipe at the Tamarack mine, leading to a 130,000-gallon concrete reservoir between Osceola shafts 5 and 6.

The Osceola mine-proper has a local telephone system, connecting all de-ents, with an exchange in No. 6 engine-house.

The Kearsarge or North Kearsarge mine, area 1,120 acres, lies north of the erine, with which it has underground connections, and with which land exchanged, to the extent of 13½ acres, permitting both mines to square boundaries with the strike and dip of the lode. Extensive diamond ng, done 1905-1907, has shown considerable good stamp-rock in the foot- and hanging-wall, at points where the main lode was impoverished. Dia- drill boring costs $2 to $3 per foot, as against $6 to $8 per foot for ing. The Kearsarge amygdaloidal bed ranges 16′ to 20′ in width, in this , and has proven very bunchy, though with good average values. The ern workings, approaching the Wolverine, are showing improvement, but ine is richest near the Ahmeek, to the north. The mine is being deepened e rate of about 400′ yearly. About 60 power drills are used in this ity. Shafts are numbered from south to north.

No. 1 North Kearsarge shaft was 3,873′ deep, on Aug. 1, 1908. The former ies under the shaft, resulting from opening through old workings, have filled with waste-rock, and capped with cement, concrete stringers being . No. 1 shaft has a Nordberg hoist, good for 6,500′ depth, operating two skips in counterbalance.

No. 2 North Kearsarge shaft is idle, having been abandoned at depth of ′, and the ground formerly tributary thereto is mined from the shafts on r side.

No. 3 North Kearsarge shaft, lying 1,825′ northeast of No. 1, was 3,192′ in h on Aug. 1, 1908, developing a large area of good ground, especially to- the Ahmeek. The collar of this shaft has been concreted, and the hoist duplicate of the Nordberg engine at No. 6 Osceola.

The No. 4 North Kearsarge shaft, started 1907, is sinking 75′ in the foot- , and will crosscut to the lode on the 7th level, the ground having been en previously by diamond drill borings. This shaft should be a producer 1910. Equipment includes a structural steel boiler-house, with a 150′ brick- d self-supporting steel smokestack of 7′ internal diameter.

The North Kearsarge surface plant includes a stone compressor-house and 0-drill compressor at No. 1 shaft, where are located also the combination chine and carpenter shop, warehouse and office, all of wood. At No. 3 shaft re is a 45-drill compressor, with 2-stage air-end and compound steam-end, ing 22x48″ and 42x48″ steam cylinders, with 40x48″ and 36x48″ water- keted air-cylinders, and vertical intercooler, housed in a 25x55′ stone and k building with steel truss roof. There is a 75-h. p. electric plant, pro- ing electric energy for both the North and South Kearsarge mines.

The South Kearsarge mine, area 160 acres, lying south of the Wolverine east of the Centennial, was known formerly as the Iroquois. Develop- t was begun September, 1899, and the best stopes are toward the Centen- line, the Kearsarge bed averaging about the same width as in the North rsarge and Wolverine mines, the rock being remarkably uniform in copper es.

No. 1 South Kearsarge shaft, to the north, was 2,604′ deep on Aug. 1, 1908, can be sunk to depth of circa 3,000′ before reaching the boundary. Two are operated, in counterbalance. The shaft-rockhouse is exceptionally and well equipped, also caring for rock from No. 2 shaft, with which it nnected by a trestle of 1,100′ length.

No. 2 South Kearsarge shaft was 1,787′ deep Aug. 1, 1908, and can be to depth of circa 2,800′, before reaching the boundary. The hoist, taken No. 2 North Kearsarge shaft, raises 5-ton skips.

Surface equipment of the South Kearsarge is mainly second-hand, taken

from other branches of the mine, but is sufficient for present requi
This branch has air-compressors of 55 drills aggregate capacity, and
40 rock drills.

The Tamarack Junior mine, area 120 acres, lying between the Ce
and Calumet & Hecla, has 2 vertical shafts, on the Calumet conglomer
2 being 3,360′ deep, with 12 levels opened. Mining was stopped, 1902,
ploratory work suspended, 1903. A little rock was shipped from the
on a royalty basis, 1906, and the shaft-house at No. 6 was burned, Ju
The Tamarack Junior apparently is dead for all time to come, so far
as the conglomerate openings are concerned, with poor prospects of
other workable cupriferous beds on the tract.

Rock is transported from the various mines to the mills by the
& Calumet Railroad, a branch of the Duluth, South Shore & Atlantic

The Osceola has 2 stamp-mills, adjoining those of the Tamarack,
shore of Torch Lake, the first mill, of wood, built 1886, having been tor
1905. The second mill, completed 1899, is 135x215′, having 3 stamps
cular screens having ⅝″ openings, allowing the discharge of coarse
The third mill, completed 1902, in line with the second, is 176x213′,
frame, having 4 Nordberg steeple-compound heads, with circular mortar
⅝″ screens and hydraulic separators, about 20% of the copper secured
ing coming from the separators and mortar discharges. The compound
stamp by superimposing the low-pressure cylinder upon the high-press
inder was first suggested by A. L. Burgan, mill superintendent of the
and the idea was carried into execution by Bruno V. Nordberg. The
mental compounded head gave such satisfactory results that the com
head is now in general use in the Lake Superior district. The wash
ment of the 2 mills has 110 Hodge jigs, with quick eccentric return
each stamp having 6 round tables and one Wilfley table, latter taking
from the round tables. There also is an Allis-Chalmers Chilean mill
grinding, and for reducing oversize material from the mortars of the
Crushing rolls with fixed bearings were introduced also by Mr. Burgan
of stamping at the Osceola mills, 1905, was only 16.95 cents per short
rock, which then constituted a world's record, and for 1907 was repo
the company as only 11.71 cents per ton.

The 43x150′ steel boiler-house, adjoining the mills and furnishing
for both, has three 72″ 250-h. p. boilers, delivering steam at 150 lbs.
and nine 84″ 250-h. p. boilers operated under 105 lbs. pressure, all of t
motive firebox type. Coal is brought to a 500-ton bin, over a trestle,
road cars, and draft is furnished by a 150′ brick-lined self-supportin
stack. An automatic ash-discharge washes the ashes through a lau
water flushed from a stand-pipe at intervals of 3 minutes. The powe
includes an Allis-Chalmers Corliss engine, operating a 100-kw. Morgan-
direct-current generator, which furnishes current for 220-volt incan
enclosed arc lamps.

The joint pump-house of the Osceola and Tamarack mines, of steel,
in size, houses two 40,000,000-gallon triple-expansion Nordberg pumps
22″, 40″ and 60″ cylinders, with three 30″ horizontal plungers of 52″ str
42″ discharge. Water is taken through an 8′ tunnel, running 1,275′ unde
Lake, drawing water through 3″ intake holes, these guarding against c
by ice.

Production has been as follows: 924,400 tons rock stamped, y
16,059,638 lbs. fine copper, in 1903; 1,095,520 tons rock stamped, y
20,472,429 lbs. fine copper, in 1904; 1,007,200 tons rock stamped, y
18,938,965 lbs. fine copper, in 1905; 1,016,240 tons rock stamped, y
18,588,451 lbs. fine copper, in 1906; 811,603 tons rock stamped, y

53 lbs. fine copper, in 1907. The decreased production of 1907 was by following the leadership of the Amalgamated Copper Co., which, as fore, in 1901, resulted disastrously to the Osceola shareholders. Copper ion was circa 17 lbs. fine metal per ton of rock stamped, in 1908, rock mainly from the North Kearsarge mine. For June, July and August, ock stamped averaged circa 111,000 tons monthly, materially the largest tion in the history of the mine. Total cost of fine copper, per pound of tion, has been as follows: 10.29 cents in 1903; 9.96 cents in 1904; 10.68 in 1905; 10.89 cents in 1906; 12.44 cents in 1907. The company ended with liabilities, all in accounts payable, of $433,026.39, with a balance of of $1,386,869.21.

he Calumet & Hecla Mining Co. owns 22,061 shares of Osceola stock, and, annual meeting, March, 1907, held proxies for about 50,000 shares addi-, thus controlling about 75% of the entire stock issue, but, through court edings, was restrained from voting its own stock or proxies, and there was nual meeting in 1907 or 1908, due to court injunctions. The litigation een protracted and bitter, but indications strongly favor the success of alumet & Hecla in securing control of the property, eventually.

EOLA GOLD & COPPER MINING CO. **WYOMING.**

Dead. Property sold, circa 1902, to North American Copper Co. Formerly ddefeha, Carbon Co., Wyo.

EOLA JUNIOR MINING CO. **WYOMING.**

Office: Rawlins, Wyo. Mine office: Dillon, Carbon Co., Wyo. J. M. sey, secretary; A. L. Clendennin, superintendent. Lands, near the Ferris-garty mine, have an old 120′ tunnel. Apparently idle since circa 1906.

URO COPPER CO.

Office: care of H. A. Rideout, Wollaston, Mass. Organized March, 1903, er laws of Maine, with capitalization $250,000. Location of lands, if any, nown.

HKOSH-WYOMING MINING CO. **WYOMING.**

Office: 365 Tenth St., Oshkosh, Wis. Mine office: Dillon, Carbon Co., o. O. A. Koch, president; E. E. Mullins, vice-president; H. O. Granberg, retary, treasurer and general manager; Frank Earle, consulting engineer. anized June 20, 1904, under laws of Wyoming, with capitalization 000,000, shares $1 par.

Lands, 11 claims, area 220 acres, in the Battle Lake district, carrying 4 ure veins in gabbro, of 22′ estimated average width, opened by shafts of and 72′ and a 22′ tunnel, showing malachite, azurite and chalcopyrite, esti-ted to carry average values of 18% copper. Idle several years.

NRIQUE OSORIO i CA. **CHILE.**

Mine office: Mina Grande, La Serena, Coquimbo, Chile. Property is El sterio mine, which produced, 1903, circa 300 metric tons of 22% ore from a n of about 40″ average width, opened to about 50 meters depth, and La risima mine, which in 1903 produced about 400 tons of 18% ore, equal to an tput of circa 300,000 lbs. fine copper.

OS OSOS MINE. **CALIFORNIA.**

Office: care of J. M. Gleaves Estate, owner, San Francisco, Cal. Mine, ar San Luis Obispo, San Luis Obispo county, California, is opened on a fissure in, carrying copper ores with porphyritic gangue, traversing sandstone and ales. Idle since circa 1865.

TA MINE. **JAPAN.**

Mine office: Ota-muri, Mine-gori, Nagato, Japan. Production, 1906, was 45 lbs. fine copper and, 1907, was 139,125 lbs. fine copper, 10,478 momme ver and 52 momme gold.

OTATE COPPER CO. MEXICO

Mine office: Llano, Magdalena, Sonora, Mex. L. H. Jansen, presid... W. P. Ross, superintendent. Lands, east of Llano, near the Cobre Gran... mine of the Sonora Copper Co., are well watered and fairly timbered, and ... said to show promising indications of ore.

OTAVI MINEN- UND EISENBAHN-GESELLSCHAFT. GERMAN SOUTHWEST AFRICA.

Office: 14 Behrenstrasse, Berlin, W., Germany. Mine office: Tsum... Otavi, Ovambaland, German Southwest Africa. Forces, 120 whites and 1,... blacks. Alex Schoeller, chairman; Dr. P. D. Fischer, vice-chairman; E. Labo... sky, chairman executive committee; preceding officers, P. Boettger, Edmu... Davis, Dr. Julius Scharlach, Dr. C. Schnabel, Dr. P. von Schwabach and L... Steinthal, directors; K. Hassinger, acting general manager; T. H. Gothma... mine superintendent; A. Morgenstein, railway superintendent; Dr. P. Glo... and Gustav Gluft, managers. Organized Apr. 6, 1900, and reconstructe... 1903, under laws of Germany, with capitalization increased from 1,000,0... marks to 20,000,000 marks, shares 100 marks par, in 20 series of 10,000 sha... each, fully issued. The company's plan of finance calls for carrying a 5... reserve, followed by dividends of 5% on ordinary shares, after which 10... will be allowed the board, as a bonus, out of surplus, and balance will b... divided equally between the ordinary and deferred shares. Company is con... trolled, through ownership of about 55% of stock, by South West Africa Co., Ltd. Annual meeting, in December.

Lands, 500 square miles freehold and 500 additional square miles of mining rights, in strips of 10 kilometers width, along the right of way of the railroad... property including valuable farming lands. Property includes the Otavi and Tsumeb mines, latter having the principal development. The mining properties show blue dolomitic limestone, with ores occurring as replacements, and occasionally as intrusions in dolomite and sandstone.

The Otavi mine has been opened to a depth of 230′, and has developed considerable ore, some of which assays up to 30% in copper tenor.

The Tsumeb mine, discovered, 1892, by natives, and taken over, 1901, by present owners, shows a strong gossan, standing above the surface for some distance. The principal ore body, of 40′ estimated average width, traceable 400′, carries copper oxides and carbonates, succeeded, at shallow depth, by chalcopyrite and galena, with occasional lead carbonates and chalcocite. Development is by the 274′ Main shaft, 225′ New West shaft, 60′ Old West shaft, 160′ New East shaft and 66′ Old East shaft. Levels are opened at depths of 65′, 160′ and 225′, with connection by three 200′ crosscuts between the principal shafts. The mine has about 4,000′ of workings, showing about 300,000 metric tons of ore, of which 60,000 tons is of low grade. It is proposed to open and work the entire ore body open-cast, to the present level of 160′.

Equipment includes a 60-h. p. steam plant and a 25-h. p. electric plant at the mine, with a 32-h. p. gasoline plant at the mill and an 80-h. p. plant at the smelter. There are two 60-h. p. hoists, good for depth of 125 meters each. Fuel is coal and wood for the mine and coke and charcoal for the smelter, coke costing 130 marks per metric ton, delivered. The company maintains a general store, and has a sawmill.

The mill has two Bartsch jaw-crushers, and gives the ore merely a rough dressing.

The smelter, at Tsumeb, near the mine and mill, receives ore by rail, and is rated at 40 to 60 tons daily capacity, having been blown in Sept. 10, 1907. Equipment includes 2 small blast-furnaces, one running on copper and the other on lead ores. Local iron ore is used for fluxing, and products are silver-lead bullion and copper matte, latter of 30 to 40% tenor, carrying circa 30 o...

r per ton, shipped to Europe for conversion, though possibly a converter t may be installed later, at Swakopmund, at the other end of the railroad. The Otavi Railway, 351 miles long, of 600-mm. gauge, runs from Swakopd, on the coast, to the interior terminus at Tsumeb, and was opened for eral traffic, for its entire length, Nov. 16, 1906. Equipment includes 37 motives and 330 cars. This railroad is doing a very satisfactory business, will be of immense utility in developing a district rich in natural rees.

Production, 1907, was circa 15,000 metric tons of ore shipped, and for 1908 s about 30,000 metric tons of lead and copper ore, estimated at 19% average or in copper and 23% in lead, yielding circa 6,000,000 lbs. fine copper, with ge quantities of lead and silver.

Average costs are estimated by company at 2 marks per metric ton for ning, and 3 to 5 marks per metric ton for concentrating.

The company plans continuing exploratory and development work, openg the Tsumeb mine below the third level, and developing other mines, inding the Little Otavi, elsewhere on the company's lands. The property is e of much promise, with a strong management, and bids fair to make one the really great copper mines of the world.

TAVI MINES & RAILWAY CO. **GERMAN SOUTHWEST AFRICA.**

English incorporation of Otavi Minen- und Eisenbahn-Gesellschaft.

TORI MINE. **JAPAN.**

Owned by Furukawa Mining Co.

TTUMWA COPPER CO. **WYOMING.**

Letter returned unclaimed from former office, Laramie, Wyo. Mine office: olmes, Albany Co., Wyo. C. B. Richey, president; W. B. Russey, secretary nd treasurer. Lands, 9 miles from Holmes, have a 280′ tunnel, not in ore. le several years.

UED-MOUGRAS COPPER & IRON CO., LTD. **ALGERIA.**

Office: 135 Wellington St., Glasgow, Scotland. Mine office: 5 Rue Lecreier, Bône, Constantine, Algeria. T. T. Stewart, chairman; J. A. French, retary. Organized Oct. 9, 1903, under laws of Great Britain, with capitalizan £12,500, increased, July 12, 1907, to £30,000, shares £1 par; issued, £24,243.

ENZA MINES CO. **ALGERIA.**

Mine office: Clairfontaine, Algeria. Property is the Djebel Ouenza mine, ar the Tunisian frontier, circa 25 kilometers from Clairfontaine. Lands show prominent gossan of cupriferous hematite, the copper being in the form of centiferous oxidized ores. Ore, as mined, 1905, averaged about 5% copper lor.

MPAÑIA MINERA LAS OURAS. **MEXICO.**

Dead. Formerly at Tepezalá, Ocampo, Aguascalientes, Mex.

RAY CHIEF MINING CO. **COLORADO.**

Office: Youngstown, Ohio. Mine office: Ouray, Ouray Co., Colo. W. D. wer, president; John Beil, secretary; David Woods, superintendent. Ores ry gold, silver and copper. Has gasoline power.

RAY CONSOLIDATED MINING CO. **COLORADO.**

Mine office: Ouray, Ouray Co., Colo. Joseph H. Tumbach, resident manr. Is successor of Colorado Gold-Copper Mining & Tunnel Co. Lands are a 60 claims, developed by a tunnel of about 5,000′ length.

ERFLOW MINES, N. L. **AUSTRALIA.**

Office: 18 Bridge St., Sydney, N. S. W., Australia. Mine office: Bobadah, S. W., Australia. T. H. Palmer, manager, at last accounts. Ores carry d, silver, lead and copper, latter being produced merely as a by-product. s a Ball mill, 40-ton cyanide plant and 50-ton smelter.

OVERLAND GOLD MINING CO. OR

Mine office: Cableville, Baker Co., Ore. Has auriferous and argent copper, lead and zinc sulphides. Presumably idle.

OVERLAND MINING CO. ARI

Letter returned unclaimed from former mine office, Willcox, Cochi Ariz. Lands are just north of the Mascot Copper Co. At last account March, 1908, property was undergoing development.

OVERLOCK COPPER CO. MI

Letter returned unclaimed from former mine office, Moctezuma, S Mex. Idle and apparently moribund.

OVERSIGHT MINING & MILLING CO. WASHIN

Office: Seattle, Wash. Mine office: Republic, Ferry Co., Wash. Preston, president; Chas. E. Murphy, vice-president; S. E. Dewsnap, sec C. A. Wallace, treasurer; E. J. Delbridge, general manager. Capitali $1,500,000, shares $1 par.

Lands, 11 claims, adjoining the Copper Ko, in the Lambert Cr Eureka district, north and west of the Turtle river, circa 10 miles no of Republic, showing 4 veins. Mine has a quarter-mile of workings, wit shaft, but principal development is by the Pinmoney tunnel. The wid money vein is mainly auriferous mispickel, carrying small silver and values. Has gasoline power, air-compressor and 300-ton shipping bin plans an aërial tram.

OVOCA COPPER SYNDICATE, LTD. IRE

Office: 10 Austin Friars, London, E. C., Eng. Mine office: County Wicklow, Ireland. Maj. Ralph P. Cobbold, chairman; W. Smith, tary. Organized Nov. 27, 1901, under laws of Great Britain, with capitali £12,000, shares £1 par.

Property is the old Cronnebane mines, in the Vale of Ovoca, which making about 1,250,000 lbs. refined copper yearly, at the end o Eighteenth Century. Mines were closed, circa 1875, and reopened, 1902, advice of Mr. Philip Argall. High grade oxidized ores were mined out i operations, but the vein, about 50' in average width, shows immense of low grade disseminated chalcopyrite, with quartz gangue, averaging a 3% copper, 1.5% zinc, 1.5 oz. silver and 1 dwt. 6 grains gold per long t new shaft has been sunk and some ore was shipped, 1907. Property c ered promising.

OWL COPPER MINING CO. CALIFO

Office: 777 Bacon Blk., Oakland, Cal. Mine office: Indian Gulch, posa Co., Cal. A. A. Leonard, president; J. T. Victor, vice-president; Thomes, secretary; Asa B. Mendenhall, treasurer; preceding officers and Hartung, directors. Organized June 17, 1907, under laws of Arizona, capitalization $1,250,000, shares $1 par.

Lands are one copper claim and two gold claims, latter being near S Springs, El Dorado Co., Cal. The John Dias mine, in Section 12, Town 6 Range 16 East, near Indian Gulch, has a 168' shaft on a 3' vein in se diabase, carrying mainly cuprite, azurite, chalcopyrite and chrysocolla, which ore has been smelted returning 2 to 30% copper and 26 cents t combined gold and silver values per ton. Company has secured ore as 27.18% copper and $2.70 gold per ton. There also are several shallo showing ore. Equipment includes gasoline power.

OWL HEAD MINING CO. ARI

Office and mine: care of Ferris S. Fitch, Tucson, Pima Co., Ariz. ized 1904, to take over sundry claims in the Owl Head Mountains, 2 from Tucson, carrying auriferous and argentiferous copper ores, also 10 miles west of Tucson. Idle, apparently since birth.

JORDALEN COPPER CO., LTD. **NORWAY.**
Dead. Liquidated Sept. 27, 1906. Formerly in Norway. Described Vol. V.

ORD COPPER MINING CO. **IDAHO.**
Mine office: Pierce, Nez Perce Co., Idaho. Was developing, with a small , November, 1908, and planned installing a power hoist and pump.

DE COPPER CO. **ARIZONA.**
Office: 85 Ames Bldg., Boston, Mass. Mine office: Red Rock, Pinal Co., . Frank Higgins, superintendent. Is controlled, through stock ownership, Arimex Consolidated Copper Co. Lands are the Copper Prince group, ously reported as 30, 50 and 140 claims, in the Silver Bell district, circa 7 s south of the Imperial mine. Apparently landed holdings are about 60 ns, area 1,200 acres, showing contact veins carrying copper sulphides with stone gangue. Property has been opened to depth of 50′ to 150′, and is to have a half-mile of workings. Production, 1907, was 319,591 lbs. fine per and 3,338 oz. silver.

CIFIC COAST COPPER CO. **ALASKA.**
Dead. Reorganized as Pacific Coast Mining, Milling & Developing Co., dead. Formerly at Ketchikan, Alaska.

CIFIC COAST OF MEXICO EXPLORATION CO. **MEXICO.**
Mine office: Magdalena, Sonora, Mex.

CIFIC COAST MINING, MILLING & DEVELOPING CO. **ALASKA.**
Dead. Formerly at Ketchikan, Alaska. Described Vol. VII.

CIFIC COAST SMELTER. **CALIFORNIA.**
Office and works: Bay Point, Contra Costa Co., Cal. Was built by the per King, Ltd. Plant includes a 100-ton furnace, with steam and electric wer. Presumably idle.

CIFIC CONSOLIDATED MINING CO. **NEVADA.**
Office: 131-32 Broadway, New York, N. Y. Mine office: Reno, Washoe Nev. Chas. B. Hill, president; Franklin Leonard, vice-president; mis A. Newton, secretary; Clinton E. Brain, treasurer; H. L. Cowles, eral manager; preceding officers, F. P. Knott, J. A. Alexander and k N. Waterman, directors; Robert W. Perry, superintendent; Dr. Jos. e Pratt, consulting engineer. Organized October, 1901, under laws of h Dakota, with capitalization $3,000,000, shares $1 par; issued, $2,500,000, hich originally $1,000,000 was common and $2,000,000 cumulative 6% pre- d stock, but all preferred shares have been retired.

Lands, 32 claims and a 50-acre millsite, area circa 650 acres, in the Pyra- district, showing 4 parallel ledges, of which 2, of 30′ to 60′ estimated ge widths, give assays of 2 to 40% copper, 6 to 100 oz. silver and $1.50 per ton. The oxidized zone, extending to depths of 200′ to 350′, carries gold and silver values, succeeded by base ores having small gold values fair silver values. Principal ore is chalcopyrite, associated with pyrite, silicious gangue. Mine has circa 30 shafts, of 30′ to 75′ depth, and a shaft of 522′, also tunnels of 250′, 1,000′ and 2,400′, with about 19,000′ of rground workings, estimated to show 500,000 tons of ore. Mine was ed, circa 1876, for gold and silver, ore turning to copper at depth. Surface ovements include a smithy, carpenter-shop and various other mine build-

Nearest railroad is 28 miles, but company has franchise for a railway nnect with Southern Pacific, estimated to cost $300,000. Property con- ed promising. Presumably idle.

IFIC COPPER CO. **MICHIGAN.**
Office: 709-199 Washington St., Boston, Mass. Mine office: Leopold , Houghton, Houghton Co., Mich. Nathaniel Thayer, president; Chas. J. e, Jr., secretary; Fred. W. Nichols, agent. Organized August, 1890, under of Michigan, with capitalization $1,000,000, shares $25 par; paid in, $2.

Ended 1907 with $35,715 out at interest, with income exceeding expendit

Lands, 960 acres, just northwest of the Atlantic mine, and suppose carry the northern extension of the Atlantic ashbed, on which a little exp tory work was done, circa 1880, previous to the organization of the comp Idle since circa 1890, but lands considered promising.

PACIFIC COPPER CO., LTD. MEX

Office: 1214 Monadnock Blk., Chicago, Ills. Operating office: 2146, Mexico, D. F. Mine office: Zihuatanejo, Montes de Oca, Guer Mex. W. S. Cockrell, president; Thos. Milan, vice-president; J. P. Ta secretary; Addison H. McKay, treasurer; preceding officers and Col. Randolph, directors; W. H. Austin, general manager; H. L. Swain, sup tendent. Organized June, 1906, under laws of Mexico, with capitaliz 10,000,000 pesos, shares 100 pesos par.

Lands, circa 30 miles from Zihuatanejo, near the Murga river, in the Copper King group, area 1,000 hectares, carrying copper and suppo placer gold, having a vein of 30′ to 200′ width, traceable about 3 miles, reported by company as tested, for about 1½ miles, to depth of 60′, at a 900′ below highest outcrop by erosion of streams at 2 points. Vein ca a gossan, mainly covered by soil, occasional exposures showing chalcop disseminated in pyrrhotite, without appreciable gold or silver values. slight depth, the pyrrhotite is replaced by argentiferous and auriferous ite, estimated by company to average 4% copper, with considerable and silver values, and which has assayed up to 16% copper, 90 oz. silve $26 gold per ton. Company estimates that gold and silver will cover a part and probably all of the cost of making copper, but this estimate is tically certain of failure. Property also is reported to carry 47 other of 1′ to 90′ width. Development is by 2 shallow shafts and 3 short tunnels. have been built to and on the property, and company plans eventually bui a railroad line from Zihuatanejo, which will be necessary for the econo working of the property on a large scale.

Equipment includes a fair outfit of machinery, installed 1907, with sary mine buildings and about 25 dwellings for workmen. Property bids to make a large low grade mine with careful development and econo management, and is considered promising. Officers include men of fina strength and good standing. Was said to employ circa 350 men, but sumably is idle.

PACIFIC COPPER EXPLORATION CO. ARIZ

Mine office: Prescott, Yavapai Co., Ariz. Geo. Roper, general man Lands, 15 claims, including a water right, in Spruce Cañon, circa 10 west of Prescott, opened by a 220′ tunnel.

PACIFIC GOLD & COPPER MINING CO. MEX

Office: 308 East Ninth St., Kansas City, Mo. J. J. Myers, presi D. C. Rhodes, secretary. Organized under laws of South Dakota, to de extensive mineral holdings in the Taviche district of Oaxaca, Mexico. traces of operations found, and apparently moribund.

PACIFIC MINING & DEVELOPMENT CO. ORE

Dead. Lands sold, circa 1903. Formerly at Galice, Josephine Co., O

PACIFIC MINING & METALS CO. ARIZ

Dead. Formerly at Globe, Gila Co., Ariz. Described Vol. VI.

COMPAÑIA DE COBRE DEL PACIFICO, S. A. MEX

Is the Mexican incorporation of the Pacific Copper Co., Ltd.

COMPAÑIA METALURGICA y REFINADORA DEL PACIFICO. MEX

Is the Mexican incorporation of the Pacific Smelting & Refining Co.,

ACIFIC SMELTING CO., LTD. **CHILE.**

Dead. Property sold, 1907, to Taltal Railway Co. Formerly at Taltal, ntofagasta, Chile. Described Vol. VI.

ACIFIC SMELTING & REFINING CO. **MEXICO.**

Office: 42 Broadway, New York, N. Y. Mine office: Fundición, Alamos, onora, Mex. Theo. Douglas, president and general manager; E. Kneeland, perintendent; Jas. F. Berry, metallurgical superintendent. Is controlled, rough ownership of entire stock issue, by Douglas Copper Co., and holds rect title to property through a Mexican corporation, the Compañía Metal-rgica y Refinadora del Pacifico. Smelter is located circa 30 miles south of e Anita mine of the Douglas Copper Co., and 153 kilometers northeast of uaymas, on the line of the Cananea, Rio Yaqui y Pacifico railroad. The melter is planned to do a general custom business, in addition to treating ouglas ores.

Ore is received from the Anita mine by trains of traction engines, each rain consisting of an engine and 5 trucks, each of the latter carrying three -ton steel ore buckets, which are dumped by overhead electric traveling rane. Equipment of the transportation service includes 4 Holt traction ngines, one having a derrick, and each drawing one trainload daily of circa 0 tons of ore. A train crew consists of an engineer, fireman and brake-an, wood being used for fuel.

The works have a 36" gauge railway equipped with 2 Davenport locomo-ives.

The works, designed throughout by Mr. Douglas, are designed to have an ltimate capacity of 600 tons daily, having a present capacity of 300 tons aily, with a single furnace.

The plant includes a small sampling mill, with a Vezin automatic ampler, mounted on trucks, of 30 tons hourly capacity, taking a cut of ne-tenth, which goes to the sampling mill.

The smelter has one 44x160" water-jacket blast-furnace, of circa 300 tons aily capacity, and is planned for a second furnace of the same size, with oom for a third. Charging is by Jeffrey roller-bearing conveyors, two per urnace, which elevate the weighed charge to the feed floor, discharging into teel bins at each side of the furnace. The side-dumping feed cars have 4 ransverse compartments, for coke, limestone, iron ore and copper ore, charges, hich are measured by gauges in each compartment, instead of weighed, being dumped into a hopper forming the boot of an incline Jeffrey elevator, which leads to buggies on the feed-floor, there being 2 elevators, of 30 tons hourly apacity. The furnace has a sheet-steel settler, 5' in diameter and 5' deep, lined with magnesia brick laid in magnesia clay.

The steel dust-flue, of the balloon type, with cars running underneath to draw off flue-dust, is 11x14x172' in size, connecting with a 177' self-supporting teel stack, 14' in diameter at the bottom and 8' at the top, standing on a 27' stone foundation. Flue-dust and fines go to a pug-mill, and are pugged to a stiff sludge, which is fed direct to the furnaces, without drying or briquetting.

The power plant has two 150-h. p. Morrison boilers, and an electric plant, for which current is furnished by a 75-kw. Westinghouse generator, direct-connected to a Bates-Corliss vertical compound engine, having 13" and 20" ylinders, and a Western Electric 25-kw. generator, direct-connected to a 9x10' ngine. Blast is furnished by a Connersville blower, direct-connected to a ates-Corliss tandem engine with 12x24x36" cylinders.

Water is secured from an artesian well having an estimated flow of 000 gallons daily.

The furnace was *blown in circa June, 1908*, when the first shipment of

ls, representatives, etc., but certainly these mishaps were through no of the management, directly or indirectly. Company is regarded with suspicion.

LANT & STOFFEL. MEXICO.

Mine office: Charcas, Moctezuma, San Luis Potosí, Mex. Arthur Pallant, ger. Mine is Los Morelos, carrying auriferous and argentiferous copper lead ores. Has steam power and a 50-ton mill, employing circa 100 men, st accounts.

M DEVELOPMENT CO. CALIFORNIA.

Dead. Formerly at Acton, Los Angeles Co., Cal. Described Vol. VI.

LMER MOUNTAIN COPPER MINING & MILLING CO. WASHINGTON.

Office: Spokane, Wash. Mine office: Loomis, Okanogan Co., Wash. nized under laws of Washington, with capitalization $1,500,000. Lands on Palmer Mountain. Idle since circa 1903.

LMER MOUNTAIN GOLD & COPPER CO. WASHINGTON.

Dead. Formerly at Loomis, Okanogan Co., Wash.

LMER MOUNTAIN GOLD MINING & TUNNEL CO. WASHINGTON.

Dead. Reorganized, circa 1905, as Palmer Mountain Tunnel & Power Co. merly at Loomis, Okanogan Co., Wash.

LMER MOUNTAIN TUNNEL & POWER CO. WASHINGTON.

Office: 303-56 Wall St., New York, N. Y. Mine office: Loomis, Okanogan , Wash. John Tilley, president; F. G. Burnham and E. Burr, vice-presidents; uel Porter, treasurer; Lee H. Porter, secretary; John Boyd, general man- r. Organized circa 1905, under laws of Arizona, with capitalization 00,000, shares $1 par, as successor of Palmer Mountain Gold Mining Co. Lands, 65 claims, on Palmer Mountain, said to show 28 veins, carrying ly gold values, opened by a 4,000′ tunnel, planned to be driven 8,000′ to a back of 4,000′. Has opened, to depth of circa 200′, a copper vein ng ores assaying up to 28.8% copper. Mine has an electric haulage system. Equipment includes necessary mine buildings, 100-stamp mill and a 750-h. p. ro-electric plant, with estimated energy of 3,000 h. p. available from Tout lee Creek.

OMA MINING CO. MEXICO.

Dead. Formerly at Ayutla, Autlán, Jalisco, Mex. Described Vol. VI.

O VERDE COPPER MINING CO. ARIZONA.

Mine office: Vail, Pima Co., Ariz. W. H. Martin, president; W. T. Payne, tary. Capitalization, $3,000,000, shares $1 par. Lands, 10 claims, 9 miles east of Vail, opened by tunnels of circa 200′ and 500′, showing auriferous argentiferous copper ore. Presumably idle.

O VERDE MINING CO. ARIZONA.

Mine office: Yucca, Mohave Co., Ariz. J. L. Whitney, manager.

IPAÑIA MINERA EL PALQUI. CHILE.

Mine office: El Palqui, La Ligua, Aconcagua, Chile. Mine, circa 20 kilo- ers from Cabildo, has a manto, or blanket vein, of about 5 meters thick- , showing an abundance of ore of 5 to 6% average copper tenor, but is handi- ed by transportation charges averaging 6.65 pesos per metric ton to the ildo smelter. Production, 1903, was circa 300 metric tons of ore averaging % copper tenor.

N-AMERICAN DEVELOPMENT CO. MEXICO.

Office: 83 Dexter Bldg., Chicago, Ills. Mine office: Aguacaliente de a, Fuerte, Sinaloa, Mex. Harry Austin Clapp, president and general man- r; Paul H. Seymour, secretary; F. B. Grubb, treasurer; Daniel H. Living- n, general superintendent. Apparently has some connection with Las Tablas pper Co.

PAN-AMERICAN EXPLORATION CO. ME

Office: 711 Missouri Trust Bldg., St. Louis, Mo. Mine office: Manz Medellin, Colima, Mex. A. K. Vickers, president; Col. Kent E. Keller, tary; Schuyler S. Gates, general manager. Organized March 8, 1901, laws of Missouri, with capitalization $1,000,000, shares $10 par.

Property is the Camotlán mine, 10 hours' ride by horseback from zanillo, carrying gold, silver and copper ores. Company formerly owne hectares, including the Cacoma mine, sold to Cacoma Mines & Smelter Co.

PAN-AMERICAN FEDERAL SMELTING & REFINING CO. NEW ME

Office: El Paso, Tex. Works office: Socorro, Socorro Co., N. M. Smith, president; W. P. Stewart, vice-president; J. A. Lowe, general ma Organized April, 1908, under laws of Arizona, with capitalization $5,00

The company was claimed, August, 1908, to be building small c smelters at Lordsburg, Grant Co., N. M., Nogales, Santa Cruz Co., Ariz. Van Horn, El Paso Co., Tex. Apparently the smelters outside of S remain in the air, and apparently the company expects citizens to donate and subscribe for stock. The Socorro plant is said to be planned to small lead and copper stacks, of 100 tons daily capacity, with a 5-to centrator in connection. Company is not regarded favorably.

PAN-AMERICAN MINES CO. ME

Dead. Formerly at Etzatlán, Ahualulco, Jalisco, Mex.

PAN-AMERICAN MINING & SMELTING CO. ARIZONA & ME

Office: 905-11 Broadway, New York, N. Y. Mine office: Prescott, pai Co., Ariz. A. Howard Skinner, president; Harry F. Lindsley, sec and treasurer. Organized under laws of Arizona, with capitali $15,000,000, shares $5 par, in $3,000,000 preferred 7% stock and $12,0 common stock.

This company was promoted by the notorious Dr. R. C. Flower, wh successful in swindling many unsuspecting American investors, and wh last accounts, was supposed to be traveling in Mexico, in various disg and hitting the high spots only. The company was also assisted in sec the Quebradillas mine, of Parral, by Grant G. Gillett, the cattle plunger, left Kansas City—and many creditors—between two suns. That precio firm of mining swindlers, L. E. Pike & Co., of Boston, also aided in the promo The company succeeded the Lone Pine Mining Co., alias the Arizona, Ea & Montana Smelting & Ore Purchasing Co., of most unsavory memory, ceeding the Buenos Aires Mining Co., Urique Gold Mining Co., Sunset M Co. and La Paz Mining Co., all dubious propositions. Several mines abandoned, without taking final titles. The Quebradillas mine, of Parral, optioned, but bond was allowed to lapse. The various Mexican holding the Pan-American company, some of which may or may not still be held cluded the Recompensa group, at Maguarachic, the Hernandez group at Mi and La Liga and Santa Camilla mines, at Concepción, all of Chihuahua, ico, also the Ambidexter group, in Arizona, located circa 1900, on which n was found. Idle and moribund.

PANAMINT GREENWATER GOLD & COPPER MINING CO. CALIFOR

Office: 234 Empire Bldg., Denver, Colo. Mine office: Greenwater, Co., Cal. Frank H. Ober, president and general manager; R. H. Riegel, president; F. H. Martin, treasurer; Geo. F. Ober, secretary. Organized under laws of Wyoming, with capitalization $1,000,000, shares $1 par. L 7 claims, area 140 acres, including 3 claims at Greenwater and 4 in the Rose district of Nevada and Skidoo district of California. Apparently as ment work not done, and claims at Greenwater subject to relocation, bo body wants them. Advertised, 1906, that it would ship ore within 90

lid not. Bears ever yindication of being a mere bit of Denver

OPPER MINING CO., LTD **IDAHO.**
allace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. John
d, manager. Lands, adjoining the Illinois claim of the Snow-
ast, are supposed to carry the extension of the Snowstorm vein.
osscut tunnel, expected to cut ore at about 1,000', giving a back

E SMELTER. **IDAHO.**
Idaho Smelting & Refining Co.

E SMELTLING CO., LTD. **IDAHO.**
apitalization was $5,000,000, shares $1 par. Officers were J. Her-
n, president; S. B. Phillips, secretary and treasurer; Theo. L.
neral manager; C. C. Titus, superintendent. Company fell into
culties, October, 1907, and was reorganized, circa January, 1908,
lting & Refining Co. Formerly at Ponderay, Bonner Co., Idaho.

COPPER CO., LTD. **WALES.**
21 Lawrence Lane, London, E. C., Eng. Geo. Thompson, secre-
zed Nov. 15, 1898, under laws of Great Britain, with capitaliza-
shares £1 par; issued, £16,007. Property is mineral rights to two
erionethshire, Wales. Inactive for some years and apparently

DE COBRE DEL PÁNUCO. **MEXICO.**
ce: Pánuco, Monclova, Coahuila, Mex. Chas. May, manager.

PPER CO., LTD. **MEXICO.**
ands sold, circa 1905, to Continental Copper Co. Formerly at
onclova, Coahuila, Mex. Described Vol. V.

O COPPER CO. **CHILE.**
ucceeded, 1898, by Central Chili Copper Co., Ltd. Formerly at
valle, Coquimbo, Chile.

PPER CO. **ARIZONA.**
l mine: Tucson, Pima Co., Ariz. H. C. Abbott, president; W. T.
e-president; E. S. Garrett, secretary. Capitalization $1,000,000,
. Lands, 50 claims, in the Comobabi Mountains, circa 65 miles
Tucson, nearest railroad point, having about 1,000' of openings,
ite, malachite and chalcopyrite. Has a hoist and air-compressor.

NING CO. **ARIZONA.**
ormerly at Aztec, Yuma Co., Ariz.

MINE. **SIBERIA.**
ine and works: Semipalatinsk, Siberia. Is owned and operated
Successors, securing an annual production of circa 150,000 lbs.
t last accounts.

DEVELOPMENT CO. **ARIZONA.**
ucceeded, 1907, by Bisbee Sonora Development Co. Formerly at
hise Co., Ariz. Described Vol. VI.

MINING CO. **ARIZONA.**
ce: Paradise, Cochise Co., Ariz. Is controlled, through owner-
of stock, by Bisbee-Sonora Development Co. Lands, near the
Mining Co., have a 245' shaft, with crosscuts showing sulphide
rade.

OPPER-GOLD MINING CO. **COLORADO.**
bsorbed, 1903, by San Juan Smelting & Refining Co. Formerly
San Juan Co., Colo.

MINING & MILLING CO. **COLORADO.**
Grand Junction, Colo. Mine office: Paradox, Montrose Co., Colo.

J. A. McCulloch, president; T. W. James, vice-president; A. A. Mill
tary and general manager; D. T. Stone, treasurer. Organized Jan.
under laws of Colorado, with capitalization $1,500,000, shares $1 par.

Lands, 12 claims, area circa 110 acres, also a 5-acre millsite, in th
and Paradox districts, 65 miles from a railroad, showing limestone, s
shales and quartzite, with intrusive porphyry, carrying 3 fissure and
veins of 2′ to 7′ width, opened by tunnels of 85′, 100′, 200′ and 400′,
melaconite and argentite, giving assay values of 3 to 75% copper,
1,000 oz. silver per ton, with a trace of gold.

PARAMATTA COPPER MINES, LTD. AUST

Offices: 22 Chancery Lane, London, E. C., Eng., and 29 bis, Rue N
Lille, France. Mine offices: Wallaroo, Daly Co., and North Yelta, I
South Australia. Eugene Dervaux, chairman; G. de Venancourt, mi
nager; Henri Duquesne, secretary. Organized May 18, 1899, under
Great Britain, with capitalization £200,000, shares £1 par. Debentures,
authorized, £9,300 issued, at 5%. Shareholders are mainly French.
netted £13,165 and in 1905 netted £7,353.

Lands, 1,340 acres, held from the South Australian governme
99-year lease expiring June 30, 1988, at annual rental of 1s. per a
2.5% royalty on net profits. Lands include the Paramatta, Yelta,
Hughes and Wheal James mines.

The Paramatta, which is the principal mine, is an old and import
ducer, adjoining the Wallaroo mine of the Wallaroo & Moonta, reopen
by present company. Deepest shaft is 500′, bottomed in a vein rangi
8′ width, with richer portions carrying up to 25% copper, and form
about 50,000 tons of ore reserves, which have been nearly exhausted by
management. A new shaft was sunk crosswise, and is practically w
Water supply is scant, causing trouble at times. Equipment includes a
machinery plant. The Yelta mine, taken over 1903, has been reope
equipped with modern machinery.

The reduction plant includes a 200-ton concentrator and a 400-ton
latter having blast-furnaces turning out matte which formerly was c
at the adjoining plant of the Wallaroo & Moonta, but is now shipped to
for reduction, at considerably increased cost. Production, for year
June 30, 1905, was 2,069,760 lbs. fine copper. Local management was c
circa 1906. Under former direction of L. G. Hancock, money was ear
dividends with copper at £57 per long ton, company paying 25% divid
1903 and 5% dividends in 1904. Under present management the c
has lost money with copper at £85 per ton. With adequate expendit
opening of new reserves, and under good management, the property is
to be capable of making a good mine, but the present management
Operations were suspended, 1907, on account of the depression in copp

PARCIONERA CONSOLIDATED MINING CO. M

Office: 29 Broadway, New York, N. Y. Mine office: Santa
Iturbide, Chihuahua, Mex. Jos. S. Qualey, president; Ernest Hes
secretary. Is a close corporation, shares $100 par. Lands, under devel
at last accounts, are said to give an encouraging copper showing.

PARINGA COPPER MINES, LTD. AUST

Dead. Formerly at Callington, Adelaide Co., South Australia. De
Vol. V.

PARINGA MINING SYNDICATE. AUST

Mine office: Callington, Adelaide Co., South Australia. Lands, 17
Presumably idle.

PARIS BOULDER MINING CO.

Office and mine: Paris, Bear Lake Co., Idaho. Andrew Madsen

J. H. Eversoll, secretary and treasurer; preceding officers, W. D. Passey, Candland, J. H. Grimmett, J. Russell Shepherd, Chas. Innes and B. F. ward, directors; L. W. Johnson, superintendent. Organized 1908, under of Idaho, with capitalization $50,000, shares 5 cents par. Lands, 23 s, showing ores carrying copper, lead and silver.

K CITY MAJESTIC MINING CO. **UTAH.**

Dead. The promoter, S. T. Rolph, disappeared. Formerly at Park City, nit Co., Utah. Described Vol. IV.

K CITY MINING CO. **WASHINGTON.**

Mine office: Keller, Ferry Co., Wash. W. T. Connell, manager. Lands de the Mountain Boy and Hercules mines, latter having a 331′ tunnel ring ore assaying up to 6.5% copper and 140 oz. silver per ton, with small values and traces of lead.

K COPPER CO. **MONTANA.**

Office: 33 West Granite St., Butte, Mont Letter returned unclaimed a former mine office, Dillon, Beaverhead Co., Mont. Wm. O. Climo, presi-; John H. Judge, vice-president; R. M. Cobban, treasurer and manager; eding officers, E. B. Howell and W. M. Bickford, directors; Forbes F. ne, secretary. Organized Oct. 6, 1906, under laws of Montana, with capi-ation $1,000,000, shares $1 par.

Lands, 6 claims, on the Wise River, said to show a 60′ vein, outcrop-g for 2,000′. Has 2 shafts, known as the Park and Williams, latter, 200′ , with 2 compartments, showing argentiferous copper ore assaying up to % copper. Has an air-compressor.

EK COPPER & GOLD MINING CO., LTD. **IDAHO.**

Office and mine: Mullan, Shoshone Co., Idaho. Patrick Burke, manager. nds, 6 claims, on the southern side of Stevens Peak, having tunnels of 550′ d 1,000′, showing a vein of 3′ to 50′ width, with average of circa 20′, capped a gossan, of about 40′ average width, of mixed hematite and siderite, carry-g kidneys of high grade copper carbonates and chalcopyrite, with some native pper. Veins apparently should carry chalcopyrite of fair grade at greater pth.

EKS MINING CO. **MONTANA.**

Mine office: Polaris, Beaverhead Co., Mont. Has copper-gold ores.

MPAÑIA ESPLOTADORA DE PARRAL. **MEXICO.**

Mine office: San Bartolo, San Juan de Guadalupe, Durango, Mex. perty includes El Lentisco mine, carrying auriferous copper ores. Idle.

RRAL SMELTING CO. **MEXICO.**

Office: care of Samuel Garrison, president, Pittsburg, Pa. Works office: ral, Hidalgo, Chihuahua, Mex. D. M. Evans, general manager. Capitaliza-, $1,000,000. Property is a smelting concession, from the State of Chihua-and it was planned to build a 250-ton smelter, with both lead and copper ks. Apparently abortive.

RROT MINING & MILLING CO. **COLORADO.**

Letter returned unclaimed from former mine office, Leadville, Lake Co., . Property includes the Golden Fleece mine, said to show auriferous and ntiferous copper ore assaying 5.5 to 22% copper.

RROT SILVER & COPPER CO. **MONTANA.**

Office: 42 Broadway, New York, N. Y. Mine office: Butte, Silver Bow Mont. Employs circa 350 men. A. H. Melin, secretary; John D. Ryan, aging director; H. A. Gallwey, superintendent; preceding officers, Sidney se, F. P. Addicks, John E. Judson and A. B. Grafius, directors. Organized , under laws of Montana, with capitalization $2,300,000, shares $10 par; ed, $2,298,500. Is controlled, through ownership of slightly more than a ority of stock, by Amalgamated Copper Co. Paid dividends, to end of

1907, of $6,807,260. Recent dividends have been as follows: 50 cents in nothing in 1903; $1 in 1904; $2 in 1905; $1.25 in 1906; 75 cents in 19 quarterly dividend of 25 cents, due November, 1907, was passed.

Lands, 19 claims, mainly fractional, area 40.6 acres, well located, central portion of the Butte district, including the Parrot, Little Mina lona and Original No. 6 mines. The Parrot mine, opened 1884, is one pioneer mines of the camp. The property shows a barren zone, at de circa 1,000', succeeded by fair ore bodies below. Ore of the mine, as a averages about 3% copper, and carries fair silver and small gold values.

The Parrot mine is opened by a 2,300' shaft, having 3 compartme the fourth level, and 4 compartments below, retimbered, 1904. The m timbered with 10x10" square sets and round timbers, having électri bells, and is connected underground with the Colusa-Parrot, Neversweat, and Original No. 6 mines. The lower workings show an ore body up in width, apparently a continuation of the Anaconda vein, carrying some grade chalcocite and bornite, but the Blue Vein fault cuts the Anaconda in such a manner that the Parrot loses about 100' in length of wo ground with each 100' in depth. The Parrot also is mining the Nipper which shows ore up to 10% copper and 15 oz. silver per ton, but the Parrot only a 5/36 interest in the Nipper vein, balance belonging to Butte Coa The Parrot shaft has a 112' steel gallows-frame, with maximum load ca of 50 tons, and a Union Iron Works hoist with 28x96" cylinders, capa raising 10-ton loads from a depth of 3,000', hoisting 2 double-deck cages 10-ton skips swung under, using a flat steel rope ⅝" thick and 8" wide.

The Little Minah mine has a 1,000' two-compartment shaft, with opened at 600', 800' and 1,000', the bottom level showing to the west a body assaying 3.5% copper and 6 oz. silver per ton, and to the ea an ore body averaging 18' width for 100' length, giving assays of 4% c and 6 oz. silver per ton. The Blue Vein fault carries some concentrati on this property. The temporary equipment at the Little Minah is to placed by a hoist good for 2,000' depth.

The Original No. 6 mine, having a shaft of circa 1,000' depth connected underground with the Parrot and adjoining mines, is a con tively small producer.

Equipment includes an 80-drill Ingersoll-Sergeant air-compressor 22-drill Rand air-compressor. Mine buildings, mainly of steel, stone and include an engine-house, boiler-house, compressor-house and a model two change-house, with cement floors, 24 shower-baths and lockers for 350 me

There is an antiquated smelter, idle since 1900, which is an asset particular value, though some copper is secured by precipitation from t dumps and slag-piles.

The company owns copper refining works at Bridgeport, Conn., whi are antiquated, and have been idle for some years.

Production, for year ending June 1, 1908, was only 57,964 tons or about one-third as much as two years previously, and smelter returns aged about 2.5% copper only, with fair silver values. In August, 19 Parrot was yielding about 300 tons and the Little Minah 100 to 150 tons Normal production is circa 8,000,000 lbs. fine copper yearly, but, for 19 about 5,000,000 lbs. only. For year ending June 1, 1907, there was a of $141,730, and for year ending June 1, 1908, there was a deficit of $1 The property apparently has seen its best days, though under normal tions it is capable of yielding small profits, with possibilities of openi ore bodies of larger size and better average grade.

PARRY SOUND COPPER MINING CO., LTD. ONT

Office: 500 Germania Life Bldg., St. Paul, Minn. Mine office:

Parry Sound district, Ont. Employs 10 men. Frank Johnson, presi-
anford B. Lewis, vice-president; Otto Monson, secretary and treasurer;
g officers, John Ogren and Chas. Burton, directors; Chas. Anderson,
perintendent. Organized March 23, 1899, under laws of Ontario, with
zation $5,000,000, shares $1 par; issued, $2,500,000. Liabilities are
t $25,000 floating indebtedness, and a $5,000 mortgage at 6% on 200
land. Annual meeting, second Tuesday in August.
ds, 10 claims, area 2,000 acres, one-half freehold and one-half held
contract requiring $2,000 to perfect title. Property, on the eastern
f Georgian Bay, includes the McGowan and Wilcox mines.
e Wilcox mine has indications of 4 parallel veins in a cross-section
t one-quarter mile, with a 145′ shaft on a 20′ ore body in granite, trace-
00′, carrying auriferous and argentiferous bornite assaying 2.8 to 11%
There also is an open-cut of 20x150′, 18′ deep, showing 3% chalcopyrite.
e McGowan mine has shafts of 100′, 100′ and 250′, and a 150′ crosscut
showing bornite and tetrahedrite, and occasional chalcopyrite, with
gangue. A smelter shipment of 240 tons of selected ore returned 17%
and $5 in combined gold and silver values.
uipment includes a 10-stamp mill, hoisting machinery and several build-

ALUE CONSOLIDATED GOLD & COPPER CO. **COLORADO.**
ad. Lost Colorado lands, now held by Redoubtable Gold & Copper
& Milling Co., through forfeiture of bonds. Formerly at Turret, Chaf-
Colo.

ALUE GOLD MINING CO. **COLORADO.**
ad. Succeeded, 1900, by Par Value Consolidated Gold & Copper Co.,
ad. Formerly at Turret, Chaffee Co., Colo.

RKSCHAFT PASCHA. **GERMANY.**
ice: Düsseldorf, Rheinprovinz, Germany. Paul Müller, president. Has
iron, copper, zinc and lead, employing circa 25 men.

GOLD & COPPER PRODUCING CO. **UTAH.**
ice: care of J. W. Guthrie, secretary, Salt Lake City, Utah. A. H.
th, president; Leonard Hilpert, treasurer. Organized, 1907, with capi-
on $500,000, shares $1 par. Lands are said to be 12 claims, in Salt
unty, Utah.

ITY COPPER CO. **MEXICO.**
ice: care of H. E. Runkle, El Paso, Texas. Lands, sundry claims, in
rra de Las Arradas, district of Bravos, Chihuahua, Mexico, developed by
ifts, one tunnel and an open-cut, with a total of about 350′ of openings,
g stringers of oxide and carbonate copper ores, in limestone. Idle and
ıtly moribund.

S & SON, LTD. **ENGLAND.**
ice and works: Bristol, Somersetshire, Eng. Property is the Bedmin-
elting Works, treating ores imported from a great variety of sources.

GONIA MINING CO. **ARIZONA.**
ice: care of Francis J. Heney, San Francisco, Cal. Mine office: Pata-
Santa Cruz Co., Ariz. Benj. Heney, president; R. R. Richardson, secre-
d treasurer; Fredk. John Zebert, consulting engineer. Capitalization
0, shares $1 par. Lands, 31 claims, unpatented, area 620 acres, in 2
known as the Hardshell and Flux, in the Patagonia Mountains, having
incline shaft with circa 2,000′ of workings. The Hardshell group shows
ous silver-lead ore, slightly zinciferous in the bottom workings, with
ores on the Flux group.

FINDER CONSOLIDATED MINES, LTD. **BRITISH COLUMBIA.**
ne office: Grand Forks, Boundary district, B. C. John Rogers, presi-

dent. Lands, on Pathfinder Mountain, circa 14 miles from Grand Forks, show 4 parallel veins of 8′ to 20′ width, carrying auriferous and slightly argentiferous chalcopyrite, disseminated in pyrrhotite, with quartz gangue, assaying 2.5 to 4% copper and circa $2 gold per ton. Has 3 shafts, with aggregate depth of 357, and about 800′ of tunnels. Has steam power, hoist, 7-drill Rand air-compressor and necessary mine buildings. Property considered promising, but idle for several years.

PATHFINDER GOLD & COPPER CO. IDAHO.

Dead. Lands were 8 claims, on the Queen River, worked in a small way, many years ago, having a 500′ crosscut tunnel, showing a vein of about 3′ width, carrying auriferous and argentiferous copper ores, with values mainly in the precious metals. Former office was Canton, Ohio. Formerly at Atlanta, Elmore Co., Idaho.

PAUDORNE COPPER MINING CO. VIRGINIA.

Mine office: Houston, Halifax Co., Va. Organized December, 1902, under laws of South Dakota. Apparently idle since birth and presumably moribund.

PAULL'S CONSOLIDATED COPPER PROPRIETARY, N. L. AUSTRALIA.

Mine office: Burr Well, South Australia. Presumably idle.

PAY COPPER CO. CALIFORNIA.

Letter returned unclaimed from former office, Tonopah, Nev. Mine office: Greenwater, Inyo Co., Cal. Lands, 4 claims, adjoining the Greenwater Black Jack Mining Co. Idle and apparently moribund.

PAYMASTER CONSOLIDATED MINES CO. ARIZONA.

Office and mine: Tucson, Pima Co., Ariz. J. Edw. Owen, vice-president and treasurer; John P. Owen, president; R. W. Langworthy, secretary. Capitalization $5,000,000, shares $1 par. Is said to have authorized, November, 1907, a $300,000 bond issue.

Lands, 52 claims, circa 25 miles southeast of Tucson, in the Pima district of the Sierrita Mountains, including the paymaster group of 17 claims; Olive group of 2 claims; North Prosperity group of 7 claims; Schumaker group of 2 claims, and Keystone group of 24 claims. The Keystone group has 3 tunnels, showing gold and lead values. The Paymaster mine, opened 1887, and said to have produced upwards of $500,000 worth of ore, under former ownership, has shafts of 90′ to 325′, with circa 4,000′ of workings, on a vein of 15′ to 20′ width, carrying argentiferous lead and copper ores, said to average 6% copper, 40% lead and 65 oz. silver per ton, with 100,000 tons of ore in sight, which estimates are considered excessive. Shipped some ore, 1907.

PAYMASTER COPPER MINING CO. WYOMING.

Dead. Formerly at Encampment, Carbon Co., Wyo.

PAYMASTER MINE. IDAHO.

Mine office: Wardner, Shoshone Co., Idaho. Lands, one mile east of Wardner, are said to have a 4′ vein carrying lead and copper values. The mine has a 280′ upper tunnel and a 100′ lower tunnel, with a 100′ blind shaft from the lower tunnel, showing good lead and copper ore, former assaying up to 42% in tenor.

PAYMASTER MINING & SMELTING CO. UTAH.

Mine office: St. George, Washington Co., Utah. S. L. Adams, Jr., superintendent. Property was said, 1906, to be operated by Samuel Newhouse and associates. Is said have a 20-ton smelter.

PEACH BOTTOM COPPER CO. NORTH CAROLINA.

Dead. Formerly at Elk Creek, Ashe Co., N. C.

PEACOCK CONSOLIDATED MINING CO. UTAH.

Mine office: Milford, Beaver Co., Utah. Lands show a fissure vein of 2′ to 5′ width, giving ore assaying up to 42% lead, 23 oz. silver and $1.60 gold per ton.

OPPER CO. **ARIZONA.**
ce: Johnson, Cochise Co., Ariz. Ben X. Williams, superintendent.
ms, near the Arizona Consolidated, Johnson Copper Co. and Cen-

OPPER CO. **CALIFORNIA.**
ormerly at Lavic, San Bernardino Co., Cal. Described Vol. V.
OPPER MINING CO., LTD. **IDAHO.**
ıre of John H. Nordquist, president, Wallace, Idaho. Mine office:
Co., Idaho. Organized 1907, under laws of Idaho. Lands, 5
he Eagle Mining Co., in the St. Joe district.
ER CO. **MICHIGAN.**
ormerly at Bessemer, Gogebic Co., Mich. Described Vol. III.
NS COPPER CO. **AUSTRALIA.**
Vas succeeded by Peak Downs Freehold Copper & Coal Co., Ltd.
50,000 paid up shares and 80,000 contributing shares. Formerly
, Clermont Co., Queensland, Australia.
NS FREEHOLD COPPER & COAL CO., LTD. **AUSTRALIA.**
Vas organized April, 1908, under laws of Queensland, as successor
vns Copper Co., with capitalization £75,000, shares 7s. 6d. par;
0 shares, 3s. 6d. paid in. Officers were John Currie, chairman;
anan & Co., secretaries; J. T. Coates, mine manager. Was suc-
May, 1908, by United Peak Downs Copper & Coal Co., Ltd.
PER MINING CO. **COLORADO.**
ormerly at Pearl, Larimer Co., Colo.
PER MINING & SMELTING CO. **COLORADO.**
care of P. B. Coolidge, manager, Lander, Wyo. Mine office:
er Co., Colo. W. L. Culbertson, president; R. E. Coburn, secre-
iley, superintendent. Lands include the Copper King and Swede
d by a 400′ shaft, showing considerable ore of good average grade,
in copper, gold and silver. Has steam power. Was under lease,
, to Western Mining & Smelting Co. Idle.
ELTING CO. **COLORADO.**
ormerly at Pearl, Larimer Co., Colo. Fully described Vol. VI.
NG CO. **ARIZONA.**
Lands passed to Great Peck Mining Co. Formerly at Providence,
Ariz.
PER CO. **NEW MEXICO.**
581 Arcade, Cleveland, Ohio. Mine office: Cowles, San Miguel
Alfred H. Cowles, president; I. C. Clifford, vice-president; Frederick
cretary and treasurer. Organized 1904, under laws of Michigan,
zation $50,000, shares $25 par.
60 acres lode claims and 272 acres placer claims, all patented, with
cluding 2 coal claims, of 811 acres, lying in the Hamilton district,
es over the mountains from Santa Fé, and about 18 miles from
. Lands are well timbered, and a considerable water power is
m the Pecos river, which company controls for 2½ miles.
perty shows granite, slate and quartzite, with underlying strata
rboniferous age, cut through by the valley of the Pecos river.
various contact deposits, having ferruginous quartzite on the
granite and slate to the north, of which two, under development,
eralized zone up to 225′ in width, with ore bodies of 12′ to 18′
dth, carrying massive chalcopyrite and massive sphalerite, formerly
give average assays of 3.5% copper, 3.75 oz. silver and $1.60 gold
e ores are slightly argentiferous and auriferous zinc, lead and
ides, of low average tenor, though in large quantities, and will

require reduction on the ground, in a plant especially adapted to the tr ment of complex sulphide ores.

Development is by the Katydid shaft of 60′ and the Evangeline shaf 310′, with 450′ of tunnels, and about 3,600′ of workings. The manage claims to have 168,304 tons of ore blocked out. The property was opened and closed shortly thereafter, owing to zinc ores near surface proving workable.

Equipment includes a 165-h. p. steam plant, with 2 hoists, good for depth each, and a 3-drill Rand air-compressor, with several mine buildings. company has been said to consider building a 23-mile branch line, from mines to Pecos switch, on the Santa Fé Railway. Idle.

PEERLESS COPPER EXTRACTION CO. ARIZO

Office: 405 Bank Blk., Denver, Colo. Mine office: Florence, Pinal Ariz. J. Bradbury, secretary; A. F. Abbott, manager. Organized circa with capitalization $1,000,000. Property is the McIntosh experimental lea plant.

PEERLESS GOLD & COPPER MINING CO. COLOR

Letter returned unclaimed from former office, 153 La Salle St., Chi Ills. Mine office: Silver Cliff, Custer Co., Colo. H. S. Taylor, president treasurer; C. E. Wilcox and A. G. Gage, vice-presidents; V. N. Brant, s tary. Organized circa 1905, under laws of Colorado. Lands, 29 claims, 3 ented, in the Spruce district, circa 12 miles from Silver Cliff, developed 1,655′ tunnel, supposed to be closely approaching an ore body.

PEERLESS MINING & MILLING CO. COLOR

Office and mine: Salida, Chaffee Co., Colo. Lands, 6 claims, on Cy Mountain, 16 miles west of Salida, opened by an 800′ crosscut tunnel, sho ores carrying values in lead, copper, gold and silver, lead predominating. several years and apparently moribund.

PEHOVAZ HERMANOS y CA. P

Mine office: Uliachiu, Cerro de Pasco, Junín, Perú. Property is a producer of silver and copper, when worked. Presumably idle.

PEÑA COPPER MINES, LTD. SP

Office: 3 Laurence Pountney Hill, Cannon St., London, E. C., Eng. office: Nerva, Huelva, Spain. Nicol Brown, chairman; Albert Straube, d chairman; T. Stephenson Dick, secretary; Enrique Schreck, mine man Wm. Neil, auditor. Organized Sept. 19, 1900, under laws of Great Britain capitalization increased, January, 1905, to £600,000, shares £1 par; is £537,600. Debentures originally were £200,000 authorized, and £193,800 is at 5%, reduced, 1907, to £63,500, with sinking fund for redemption amou to £51,500. Net profits for fiscal years have been as follows: £17,293 in £45,697 in 1906; £19,522 in 1907. Dividends have been as follows: 5% in 5% in 1905; 4% in 1906; 7½% in 1907.

Lands, 183 hectares, 2 miles northeast of the Rio Tinto, being the del Hierro group of 17 old mines, taken over from the Sociedad Peninsul Brussels. Extraction is mainly open-cast, and large quantities of overb are removed, stripping having been 195,430 cubic meters in 1905; 2 meters in 1906, and 174,324 meters in 1907. Eventually the capping w removed almost entirely, and the mine worked open-cast down to the 9th there being a very limited amount of underground mining in progress. reserves were estimated, 1907, at 3,000,000 long tons.

Equipment includes hoists, crushing plant, shops and dwellings. A 2½ private line, equipped with one locomotive and 14 cars, connects the and works with the nearest railway.

Ores produced are divided into cupriferous pyrites, iron pyrites and w sulphur ore, latter being ore previously leached for copper, and sold ther

ulphur contents. The leaching plant has settling tanks, boilers and pumps. cupriferous pyrites of the Sierra Morena lend themselves with special ty to copper extraction by a combination of natural weathering and arti- leaching, and this process, in use by the Peña, gives cheap costs, but en- long waits and heavy investments before profits are returned, a term of 10 years being required for complete extraction of copper values, which s that the operators must put more in than is taken out, for a long term ars.

Production was 624 long tons fine copper in 1902, and for 1905 was ,800 lbs. fine copper and circa 110,000 long tons of pyrites, sold for sul- At the end of 1905 the quantity of ore in the tereros, or leach-heaps, 480,803 long tons, and Dec. 31, 1907, was 536,476 long tons, estimated to in 4,119 long tons fine copper. Owing to prolonged drought, production ampered in 1907, but heavy rains, at the end of the year, gave sufficient ves of water. Production, 1907, included 15,104 tons of leached sulphur 9,550 tons of ore extracted and 167,236 long tons of ore added to leach- , and production of fine copper has been as follows: 1,724,800 lbs. in 2,421,440 lbs. in 1906; 2,036,160 lbs. in 1907. Property is considered val- and well managed.

EDAD ANONIMA MINERA DE PEÑAFLOR. **SPAIN.**

Office: Bilbao, Vizcaya, Spain. Mine office: Peñaflor, Sevilla, Spain. Luis de Salazar, president; Don P. Alzaga, manager; Don Angel Iznarde y e, superintendent. Organized Jan. 1, 1901, under laws of Spain, with alization 4,500,000 pesetas. Property includes the Concepción, Descuido Segunda Preciosa mines, equipped with an electric pumping plant. Is sup- l to be working with a small force.

D D'OREILLE GOLD & COPPER MINING CO. **WASHINGTON.**

Mine office: Davenport, Lincoln Co., Wash. Idle several years.

INSULA MINING & SMELTING CO. **MEXICO.**

Dead. Lost lands, circa 1904. Formerly at Santa Catarina, Norte, Baja ornia, Mex. Fully described Vol. V.

EDAD PENINSULAR DE BRUSSELS. **SPAIN.**

Dead. Was wound up, 1900, and mines sold to Peña Copper Mines, Ltd. erly at Nerva, Huelva, Spain.

N-ARIZONA COPPER CO. **ARIZONA.**

Office: Greenburg, Pa. Mine office: Prescott, Yavapai Co., Ariz. R. H. tz, president; N. J. Baxter, vice-president; Geo. S. Sarver, secretary; Jas. eeble, treasurer; S. J. Gnash, general manager. Organized under laws of na, with capitalization $1,000,000, shares $1 par. Lands, 27 claims, in opper Basin district.

N CHEMICAL WORKS. **CALIFORNIA.**

Office and mine: Campo Seco, Calaveras Co., Cal. J. K. Harmon, presi- and general manager; Albert C. Harmon, secretary, treasurer and super- dent; A. L. Willie, assistant superintendent; John Cocking, mine foreman; t Baird, smelter superintendent. Organized 1880, under laws of Cali- .

Lands, 4 claims, area 80 acres, patented, also a 20-acre smelter-site, 640 of timber lands and 450 acres miscellaneous lands, giving total holdings 90 acres, in the Campo Seco district. Property includes the Campo Seco, and Satellite mines, which were considerable producers, circa 1860-1870. are developed by 5 tunnels and 2 shafts, latter of 500′ and 700′, cutting ore body, at depth of 400′. Ore is slightly argentiferous and auriferous pyrite, associated with sphalerite and pyrite, with gangue ranging from e schist, through clay, to quartz.

Equipment includes steam plants of 150 h. p. at the mine, and 400 h. p.

at the smelter. Shafts have 44-h. p. and 100-h. p. hoists, good for depths of 1,000' and 2,000' respectively, and there is a 14-drill Ingersoll-Sergeant air compressor. Fuel is petroleum. A little cement copper is produced by leaching old waste burrows.

The property is served by the Southern Pacific Railway, 6 miles distant, and transportation is by wagon between the mine and Valley Springs, the distance being short, allowing one round trip daily.

The smelter, one-fourth mile from the mine, receiving ore by tram, has a 100-ton blast-furnace and two 50-ton reverberatory furnaces. The works have been much improved, and brought to the point of doing economical work. The works produce matte, brought to 60% copper tenor in 3 fusions, shipped to the American Metal Co., Ltd., New York, for refining and marketing. Semi-pyritic smelting formerly was employed in the blast-furnace, but reduction is now mainly by reverberatories, burning petroleum, effecting an estimated reduction of 40% in cost of smelting. Property considered promising and management good.

PENN-MONT MINING & MILLING CO. MONTANA.

Office: 102 Trout Bldg., Lancaster, Pa. Mine office: Elliston, Powell Co., Mont. W. H. Guthrie, president; C. V. Lichty, vice-president and fiscal agent; W. J. Merrill, secretary and treasurer; Thos. S. Rogers, superintendent. Organized under laws of Montana, with capitalization $1,000,000, shares $1 par. Lands, 460 acres, including 15 lode claims and one placer claim, circa 2 miles south of Elliston, opened by a 100' incline shaft and a 125' vertical shaft, showing a 4' fissure vein in granite, carrying mainly auriferous and argentiferous lead ore, but it is hoped to develop copper sulphides of good average tenor at greater depth. Is said to plan a concentrator.

PENNSYLVANIA & ARIZONA CONSOLIDATED COPPER CO. ARIZONA.

Office: care of Wm. Cunningham, secretary, Phoenix, Ariz. Mine office: Hot Springs, Yavapai Co., Ariz. Jas. H. Bennett, president and manager; Jos. J. Shaw, vice-president. Organized circa January, 1907. Lands, 8 claims, about 10 miles north of Hot Springs, in the Red Picacho district, showing a 47' vein with prominent gossan opened to depth of 300', carrying sulphide ore at depth of 285'. Shipped, 1907, ore of 20 to 40% copper tenor, to the Humboldt smelter.

PENNSYLVANIA & CANANEA COPPER CO. MEXICO.

Office: 1220-25 Broad St., New York, N. Y. Mine office: Baca Bldg., La Cananea, Arizpe, Sonora, Mex. Robt. Mitchell, president and general manager; Henry J. Stevens, vice-president; E. B. Crary, treasurer; Geo. A. Fitch, secretary; Chas. McHenry, superintendent. Organized under laws of Arizona, with capitalization $5,000,000, shares $10 par; issued, $2,500,000. Direct title to lands is held through South Cananea Copper Co., S. A., organized under laws of Mexico.

Lands, 587 hectares, including the Collins group of 305 pertenencias, Arizpe group of 40 pertenencias, Homestake group of 60 pertenencias, Last Chance group of 22 pertenencias and Gladys group of 150 pertenencias, latter adjoining the Massey mine of the Greene Consolidated, and supposed to carry the extension of the Massey ore body, bulk of lands being circa 2 miles from La Cananea. Considerable development has been secured, the Collins claim having a 250' shaft. Company was said, 1906, to have bought a tin mine in the state of Jalisco, of which nothing has been heard since, and was said, late 1906, to have sold lands to Cananea & Globe Exploration & Development Co., another Mitchell company.

PENNSYLVANIA, CANANEA & GLOBE MINING CO. ARIZONA.

Office: 37 Wall St., New York, N. Y. Mine office: Globe, Gila Co., Ariz. Geo. Mitchell, general manager; John Britt, superintendent. Appar-

closely connected with Pennsylvania & Cananea Copper Co. Is said bought a controlling interest in the Five Points Mining Co., having s in the Pinto Creek district, also 3 groups of claims near Superior, , Ariz. Idle and apparently moribund.

'LVANIA CENTRAL GOLD MINING CO. **COLORADO.**

oflice: Russell Gulch, Gilpin Co., Colo. Property is the Delaware ne, carrying ores of gold, silver and copper. Has steam power.

'LVANIA COPPER CO. **NEW MEXICO.**

l. Formerly at San Pedro, Santa Fé Co., N. M. Described Vol. VI.

'LVANIA COPPER MINING CO. **PENNSYLVANIA.**

l. Delaware charter repealed 1903. Was promoted by Paul Morris & merly at Pottstown, Montgomery Co., Pa. Described Vol. VI.

'LVANIA MINE. **MONTANA.**

ed by Boston & Montana Consolidated Copper & Silver Mining Co.

'LVANIA MINING CO. **NEW MEXICO.**

e: Franklin, Pa. Mine office: Los Cerillos, Santa Fé Co., N. M. y gold, silver, copper and lead. Idle several years.

'LVANIA & MONTANA MINING CO. **MONTANA.**

office: Basin, Jefferson Co., Mont. Curtiss Denbow, secretary. irca 100 acres, having a 130′ shaft showing a 2′ vein carrying an 8″ aystreak.

'LVANIA SMELTING CO. **IDAHO.**

ks office: Ponderay, Bonner Co., Idaho. Geo. Faunce, president. is a one-third share interest in the Idaho Smelting & Refining Co., he Ponderay smelter.

'YOMING COPPER CO. **WYOMING.**

e: 731 Monadnock Bldg., Chicago, Ills. Branch offices: 1308-74 y, New York, N. Y., and 14 Great Winchester St., London, E. C., Eng. ce: Rudefeha, Carbon Co., Wyo. Works office: Encampment, Carbon o. E. M. Cobb, president; Frank Burke Draper, first vice-president; Norton, secretary and general manager; preceding officers constitute utive board; John F. Mallory, second vice-president; preceding officers, onard, Frederick Davidson, D. H. Lambertson and J. Q. Riddle, di- L. M. Fishback, treasurer; H. Gulliver, London secretary; Geo. H. neral superintendent; J. B. Barriani, transportation superintendent.

nized Sept. 13, 1904, under laws of Wyoming, with capitalization 00, shares $1 par; issued, circa $9,000,000. Succeeded North American Co., organized 1902, under laws of New Jersey, with capitalization 00, shares $100 par. Of the capitalization of the Penn-Wyoming, half aside for the redemption of $1,500,000 worth of bonds of the North Copper Co., at the rate of 3⅓ for 1. Controls, through ownership of 90% stock issue, the Haggarty Copper Mining Co., Encampment Smelting ampment Tramway Co., Encampment Pipe Line Ditch Co., Encamp- nd & Townsite Lot Co., Carbondale Coal Co., Emerson Electric Light toga & Encampment Railroad Co. and North American Mercantile named corporation being the purchasing and distributing end of the oming. Controls the Battle Lake Tunnel Site Mining Co., through p of $2,361,400 stock out of total issue of $2,500,000. The Battle pany had outstanding, June 15, 1907, bonds aggregating $13,400.

company paid dividends, at the rate of 6% yearly, for 2 years, until 907, on issued stock, when the dividend rate was increased to 8%, ividend of July, 1907, was canceled, on account of the burning of the Dividends paid to July, 1907, were $531,250, on outstanding share $5,500,000. The company has circa 3,400 shareholders, a large num- om are residents of Great Britain.

Lands, including holdings of the Battle Lake Tunnel Site Mining C aggregate 1,373 acres, property including 773 acres of patented mineral lan 80 acres of coal lands, a 24-acre millsite, limestone quarry, 320 acres of timb lands and the entire townsites, less lots sold, of Encampment, Rudefeha a Rambler.

The Ferris-Haggarty mine, 8 claims, one fractional, 5 patented, area 1 acres, discovered 1898, shows an outcrop of decomposed spongy limonite, wit carbonate copper stains, under which is a fissured zone of about 20′ averag width, having a mica-schist hanging-wall and slightly stratified footwall, wit strike of northwest and southeast, and dip of 50° from the horizon to th southwest. At depth of about 40′ the ore is massive bornite, carrying 40 t 45% copper and $2 to $9 combined gold and silver values per ton. The ric zone has been partially worked out, the bornite being replaced, in the lowe levels, by disseminated chalcopyrite, estimated to average 10% copper, 1½ oz. silver and $6 gold per ton, but yielding, in actual production, 4 to 6% copper, about 1 oz. silver and $2 to $4 gold per ton, with mixed charges, includ ing ore from the old mine dump, estimated to average about 4% copper. A promis ing new ore body, opened, 1907, by crosscuts on the 140′ level, is about 1 wide, for depth of 75′ and length of 350′, and is estimated, by Superintendent Hand, as averaging better than 20% copper, which probably is an over estimate. The statement by Swasey & Co., of New York, that the Ferris-Hag garty has a vein of 65′ average width averaging 8% copper is a serious exag geration. A low grade copper vein was located by diamond drill, September, 1908, at a distance of 130′ in the footwall. Development is by a 1,490′ main working tunnel, connecting with a 540′ shaft, and a 180′ winze has been sunk below the tunnel level. The mine has about 6,500′ of workings. Ore is milled down to the tunnel level, through chutes, and hauled to ore-bins at the portal by compressed air locomotives. The mine was estimated, July, 1907, to be capable of producing 500 tons of ore daily, which seems a serious overestimate in view of the comparatively limited extent of the workings.

The power plant of the Ferris-Haggarty mine, at the mouth of the tunnel, includes three 180-h. p. boilers, a 25-drill air-compressor, and a 3-stage Norwalk air-compressor furnishing air, at 1,250 lbs. pressure per square inch, to a 5½ Porter locomotive used for underground traction. There also are 4 hoists, and 24 power drills. Buildings include a 30x40′ wooden machine-shop, 20x40′ wooden carpenter-shop, a 35x42′ wooden smithy, office, warehouses, ore-bins, bunkhouse, eating-house and 14 dwellings.

The Osceola mine, adjoining the Ferris-Haggarty, is but slightly developed, and apparently is not a producer.

The Doane-Rambler mine, 30 claims, area 600 acres, with 80 acres of miscellaneous lands, shows country rocks of granite, diorite and quartzite carrying numerous veins, of which 5, under development, of about 4′ average width, show oxidized ores above and sulphides below, latter mainly chalcopyrite, but with considerable chalcocite, covellite and bornite, which have shown an average assay of 40.7% copper from 16 carload shipments. The mine is opened by a 500′ working shaft and 3 tunnels, two longest 900′ and 1,600′, with upwards of one mile of underground workings, and is considered a promising property. Plant includes 3 boilers, an air-compressor and a 70-h. p. hoist.

A 16-mile Leschen aërial tramway, which is the longest installation of the sort ever made, connects the Ferris-Haggarty mine with the smelter. The tram was built in 4 sections, of 4 miles each, but is now operated in two 8-mile sections, by steam power, generated at 2 stations, 8 miles apart, each station having storage-bins. The length of cables is 293,275′; weight of cables 439,669 lbs.; number of tension stations, 16, four being double; greatest elevation above sea-level, 10,690′, on Bridger Peak; highest tower, 69′; number

); highest span, 250′ above surface, at Heaning's Gulch; longest
′, across Cow Creek Cañon; general rise, 900′; number of buckets,
vice; capacity 700 lbs. each; speed, 5½ miles per hour; maximum
city, upwards of 1,000 tons. The plant has automatic filling and
g devices, and was built so that its capacity can be doubled, if de-
e aërial tramway has given some trouble in operation. A 2-mile
mway to the Doane-Rambler mine apparently is not completed.
eduction plant, located on the banks of the Encampment river, does
business, in addition to treating the company's own ores. The first
or, burned, March, 1906, was replaced, July, 1907, with a larger
r mill, of 800 tons daily capacity. The concentrator is in 2 parts,
hroughout, with a drop of about 60′, permitting the handling of ma-
gravity. The plant has storage-bins and picking-tables, equipment
a 700-ton Blake crusher, 4 roughing and finishing rolls, automatic
revolving trommels, hydraulic classifiers, two 700-ton Hancock jigs,
grinding rolls, two 6′ Calumet regrinding mills, 8 Frue vanners, 12
bles and a V-shaped slime tank, 12′ deep, 28′ wide and 70′ long. Tail-
the new mill are reported by the company to assay under 1% of
al metallic values, which seems almost too good to be true. The old
as burned May 10, 1907, this being the second bad fire in 3 years,
v smelter, of steel frame on concrete foundations, rated at 1,000 tons
acity, was blown in Aug. 16, 1907. Equipment includes a 100-ton
raight-line roaster, a 40-ton mechanical straight-line roaster, and
nd 300-ton water-jacket blast-furnaces. Slag is granulated by a jet
and washed through a launder to the dump. Blast for the furnaces
ed by No. 6 Connersville and No. 7 Greene blowers.
onverter department has a 25-ton electric traveling crane, 3 converter
ted electrically, and 6 shells, of the Copper Queen type. Linings are
mixture of clay and quartz, ground in a 7′ silica-mill, replaced every
rge. Blast for the converters is supplied by an electrically driven
r-compressor, with a capacity of 6,000 cubic feet of free air per min-
pressed to 15 lbs. per square inch. There also is a White mineral
briquetting fines and flue-dust.
power plant includes hydraulic and steam installations. Water is
hrough a 4-mile pipe-line, of 48″ diameter, from a 23′ dam on the
k of the Encampment river, driving 6 DeRemer impact wheels, direct-
with generators furnishing current for a 1,000-h. p. common system.
r-power plant proved somewhat unreliable, varying in energy deliv-
600 to 1,200 h. p., hence was supplemented by a steam plant with
h. p. Babcock & Wilcox boilers, and a 500-kw. Westinghouse-Parsons
bine. Fuel for power purposes is wood, costing circa $3.50 per cord,
is used for smelting. The company has a mine of lignite, on the line
rial tramway, at Carbondale, 12 miles from Encampment.
ings at the reduction plant include a machine-shop, pattern-shop,
p, foundry, sawmill, smithy, office and laboratory. The Encampment
orks Co., owned by the Penn-Wyoming, has a franchise for supplying
the town of Encampment, and the Emerson Electric Light Co. has
ng franchise for the town.
company's operations were greatly hampered by inadequate trans-
facilities, the smelter being 45 miles from Walcott, the nearest rail-
ion. The Saratoga & Encampment Railway Co., capitalized at
, is controlled through ownership of entire stock issue, and, at last
a $750,000 bond issue by the railway company remained in the Penn-
treasury. The railway, of 45 miles length, of standard gauge, was
August, 1908, giving greatly reduced operating costs.

The mine secured more or less production in 1902 and 1903, and the smelter was again blown in June 28, 1905, running continuously until Oct. 29, 1905, making, in that campaign, 2,385,629 lbs. fine copper, 3,549 oz. silver and 226 oz. gold, from 28,039 tons of ore smelted, giving an average extraction of 4.25% copper, said by company to have been made at the cost of slightly under 9 cents per pound. For 1906 production was 2,402,985 lbs. fine copper, secured at a gross cost, for mining, smelting and hauling to railway station at Walcott, of $203,000.57, giving average costs of 8.45 cents per ton, showing a marked gain over the preceding year, gross receipts being $378,786.58. In 1906 smelter costs were $64,213.24, or $2.46 per ton, on 26,145 tons of ore smelted, the cost of $2.46 per ton of ore, or 2.67 cents per pound on finished copper, with an average return of 5.36% copper per ton of ore smelted, showing an increase in average copper tenor of ore and decrease in costs. The smelter was again blown in March 15, 1907, running until May 10, 1907, making 1,580,000 lbs. fine copper from 11,000 tons of ore smelted, giving an average return of 7.2% copper. Production was resumed, September, 1907, and was said to average about 4% copper, from Ferris-Haggarty ore. Production was said, February, 1908, by Swasey & Co., who were selling the company's shares, to be 600,000 lbs. fine copper monthly, but these figures are considered excessive, and apparently production, May, 1908, was circa 125 tons of ore daily. Production, 1908, is estimated at 5,000,000 lbs. fine copper.

Assets of the old North American Copper Co. were bought, at public sale, by the present company. A suit against the Penn-Wyoming, by shareholders of the old North American, has been decided against the plaintiffs, who apparently lack grounds for complaints against the Penn-Wyoming company or management. The statement, in a former edition of the Copper Handbook, that Mr. E. M. Cobb, president of the Penn-Wyoming, formerly was connected with Mr. John S. Carey in the management of the North American, was based on misapprehension, as the only connection of Mr. Cobb with Mr. Carey, or with the old North American company, was that of an unfortunate investor.

In past editions of the Copper Handbook the Penn-Wyoming Copper Co. has been criticized for two shortcomings and one misfortune, the latter being the lack of a railroad, which has been remedied by the completion of the rail line. The principal criticism was based upon the payment of dividends contemporaneously with the raising of additional capital by sale of shares, a policy that is wrong, no matter by whom followed, or how strongly endorsed. The last financial statement obtained from the company, of date August, 1907, gave assets of $76,481.07 accounts receivable, practically all due from subsidiary companies, $3,657.50 bills receivable of the Battle Lake Tunnel Site Mining Co., and $6,695.13 cash on hand. Current liabilities included notes payable of $370,086.76, due on the Ferris-Haggarty mine, and $318,959.62 trustee notes, running to A. F. Richardson, secured to the trustee by underlying notes of the various subsidiary corporations aggregating $1,390,798.62, held by the trustee under an agreement to cancel all notes of the various subsidiary corporations upon payment of the Penn-Wyoming notes for $318,959.62, this amount being the balance due on the underlying notes, on which $1,072,839 had been paid previously. The anomalous arrangement, formerly existing, by which stock of the Penn-Wyoming, while nominally common stock, and on a parity, was, for all practical purposes, divided into three classes, has been terminated, there being now only common stock outstanding, with all shareholders on an equal footing.

Apparently the company has considerable indebtedness, and its inability to sell its $750,000 railroad bond issue is said to have caused financial embarrassment. A stockholders' committee was endeavoring, late 1908, to work out a plan of reconstruction. The cost-sheets of the 1906 and 1907 smelting cam-

ns show that copper has been produced, in considerable quantities, at onable prices, and, as pointed out by the Copper Handbook two years ago, ultimate success of the mine would seem to depend upon its ability to fur- large tonnages for steady smelting operations. Apparently the mine has en unequal to the task, owing to insufficient development. While the agement has been censured, in past editions, for its mistaken policy of ing dividends while raising further share capital, it is believed that the agement has been doing its best to work out from under an embarrassing l of debt, and it is to be hoped that some plan of financing may be devised which the company will be given the considerable working capital needed nable it to develop its mines to a point where they can furnish a steady assured tonnage to the smelter.

IEDAD ANONIMA MINAS DE PEÑUELAS. SPAIN.

Office and mine: Paimogo, Huelva, Spain. José Maria Soto y Rosso, rman; Miguel Borrero Morón, vice-chairman; Mateo Santos Mora, secre- ; Gregorio Peres Díaz, treasurer. Organized July 19, 1898, under laws of n, with capitalization 12,600 shares, wholly issued. Annual meeting, in ist.

Lands, 139 hectares, with miscellaneous lands giving total holdings of ectares, in the Paimogo district, showing slate and granite, with numerous e and contact veins, of which one, under development, of 4′ estimated ge width, shows oxidized ores and chalcopyrite, giving average assays of % copper, developed by shafts of 200′, 30′, 60′ and 50′, and by tunnels 0′ and 130′.

Equipment includes an 18-h. p. hoist, and there are 17 dwellings and cot- for workmen.

Product is mainly cupriferous pyrites, sold to Thos. Morrison & Co. Mine rved by the Tharsis Railway. Production, to Jan. 1, 1908, was circa 4,000 of ore, giving average returns of 15.34% copper. Production, 1907, esti- d at 125,000 lbs. fine copper.

PLES MINING CO. ARIZONA.

Office and mine: Willcox, Cochise Co., Ariz. S. N. Kemp, superintendent. nized circa 1905. Has auriferous and argentiferous copper ore, said to hown in considerable quantities, with steam power.

CIVAL MINING CO. WISCONSIN.

Dead. Organized 1873, succeeded 1898, by Percival Copper Mining Co. nerly at Gordon, Douglas Co., Wis.

CY-CHESTER CONSOLIDATED MINING CO. COLORADO.

Office: Council Bluffs, Iowa. Mine office: Red Cliff, Eagle Co., Colo. I. Donald, lessee. Ores carry gold, silver and copper. Has steam power. umably idle.

CY RIVER SYNDICATE. AUSTRALIA.

Office: Irvinebank, Queensland, Australia. Mine office: Ortona, via getown, Queensland, Australia. C. E. Young, secretary; J. F. Puxley, gen- manager; E. Joyce, superintendent. At last accounts employed 12 men, ploratory work, in connection with the Ortona.

NCISCO DE PAULA PEREZ. CHILE.

Mine office: Los Condes, Santiago, Chile. Works office: Ñuñoa, San- de Chile. Property is La Central mine, opened 1880, adjoining the prop- of the Compañía Esplotadora Los Bronces, and the two were driving a long l, jointly, at last accounts. Ores average, after selection for smelting, 23% copper. La Central smelter has a matting furnace only, and pro- on, 1903, is estimated at 500,000 lbs. fine copper.

KIOMEN MINES. PENNSYLVANIA.

Mine office: Shannonville, Montgomery Co., Pa. Are old mines, that were

quite extensively worked, and produced a large variety of copper and lea at one time. Long idle.

PERMIAN & TRANS-PECOS COPPER CO. TE

Dead. Texas charter forfeited, 1905, for non-payment of taxes.

PERSON CONSOLIDATED COPPER & GOLD MINES CO. NORTH CAROL

Office: 1901-42 Broadway, New York, N. Y. Mine office: Virgilina, fax Co., Va. E. D. Beecher, president and general manager. Organized laws of New York, with capitalization $1,000,000, shares $10 par.

Lands, 1,372 acres, in several neighboring tracts, including the D mine, located in Person county, North Carolina. Main shaft, 330'. Vein ages 4' in width, carrying ores ranging 4 to 20% in copper tenor. Has a 5 concentrator. When worked, shipped concentrates averaging 45% copper 20 oz. silver per ton, with small gold values, sending a limited amoun high-grade ore, averaging 30% copper and 10 oz. silver per ton, direc smelter. Idle.

PERÚ COPPER SYNDICATE, LTD. PE

Dead. Liquidated July 16, 1906. Formerly in Perú.

PERUVIAN COPPER MINING & SMELTING CORPORATION. ARGENTI

Dead. Was still-born.

PERUVIAN MINING & MILLING CO. UT

Mine office: Alta, Salt Lake Co., Utah. B. F. Clays, superintend Capitalization was increased, 1908, to 250,000 shares, presumably $1 Lands, 5 claims, known as the Hungry Ten group, idle several years 1908. Development is by a 1,100' tunnel, being driven for the main cont and cutting several fissure veins giving assays up to 12% copper, 20% l 78 oz. silver and $1.60 gold per ton. Property has several mine buildings.

PERUVIAN MINING, SMELTING & REFINING CO. PE

Office: 400-55 Congress St., Boston, Mass. Mine office: Moroco Junín, Perú. Works office: Rio Blanco, Junín, Perú. A. S. Hight, presid S. E. Farwell, treasurer; Julio L. East, general manager; G. Wagner, m superintendent; S. C. Hazelton, smelter superintendent; A. A. Abbott, c sulting engineer; M. F. Church, constructing engineer. Organized July 1906, under laws of Maine, with capitalization $5,000,000, shares $10 p issued, $4,000,000. Has outstanding a $950,000 issue of 7% convertible bo Is controlled, through ownership of $1,000,000 stock, by United States Sm ing, Refining & Mining Co.

Lands include the Churruca mine, in the Morococha district, said to capable of producing 300 tons daily of ore averaging 9% copper, with silv and gold contents.

The reduction plant, blown in July 5, 1908, of 300 tons daily capacity, h a steel building, terraced, to use gravity throughout, and treats largely co ores. The smelter is at Rio Blanco, on Lake Huacracocha, near Lake Mar cocha, 135 kilometers from Callao and 120 kilometers from Lima, on the Ferr carril Central del Perú.

A railroad track, on a trestle behind and above the sampling mill, ru over ore-bins, which discharge to belt-conveyor carrying ore to the sampl which is of 60 tons hourly capacity, equipped with Vezin automatic sampli machinery. The ore-bins are of 12,000 tons capacity, and storage is provide for 600 tons of limestone and 300 tons of coke.

The smelter has a 100-ton cintering plant, for concentrating ores befor smelting, consisting of 12 one-ton pots.

The cupola building has a 44x186" blast-furnace, with room for a seco of the same size, making matte of 50 to 55% copper tenor. The furnace ha

e of brick, on steel columns, bottom being hoppered for automatic dis- of accumulated dust, with 2 dust-chambers, of masonry, intervening n the flue and stack, latter being of steel, 150′ high and 12′ in diameter. ere is a hydro-electric power plant, with a 1,200′ pipe-line of 40″ diam- om the Rio Blanco, delivering water to the power-house under a head ′, generating approximately 500 h. p. There is a Connersville blower of cubic feet capacity, and three 35-kw. direct-current generators, which tuate an electric light plant. Miscellaneous buildings include a machine- smithy, office and dwelling.

SKEY MINING CO. **ARIZONA.**

etter returned unclaimed from former mine office, Williams, Coconino riz. Organized 1907. Built a leaching plant, which was burned. Since nd apparently moribund.

O MINING CO. **UTAH.**

ead. Lands sold, 1905, for $30,000, to Utah-Apex Mining Co. Formerly gham Canyon, Salt Lake Co., Utah.

ABIC MINING CO. **MICHIGAN.**

ead. Wound up, 1905. Lands now owned by Quincy Mining Co. For- at Hancock, Houghton Co., Mich. Described Vol. II.

ON CHEMICAL CO. **CALIFORNIA.**

ffice: 430 Mills Bldg., San Francisco, Cal. Mine office: El Dorado, El o Co., Cal. Works office: Peyton, Contra Costa Co., Cal. Property is oonday mine and adjoining claims, in the Diamond Springs district. The lay, held under bond and lease, has shipped a little ore to the company's . Presumably idle.

GOLD MINING & REFINING CO. **ARIZONA.**

ead. Merged, 1907, in Verde River Copper Co. Formerly at Jerome, ai Co., Ariz.

DELTA THETA COPPER MINING CO. **WYOMING.**

ead. Formerly at Dillon, Carbon Co., Wyo.

ADELPHIA & ARIZONA MINING CO. **ARIZONA.**

ffice: 614 Real Estate & Trust Bldg., Philadelphia, Pa. Mine office: ide, Mohave Co., Ariz. H. T. Goodman, president; E. F. Lukins, secre- and treasurer; E. T. Loy, general manager. Organized 1900, under laws izona, with capitalization $1,000,000, shares $1 par.

ands, in the Wallapai district, include the Minnesota, Merrimac, Connor, anita and other mines, carrying sulphide ores, in fissure veins averaging lth, with assay values of 1 to 20% copper, 15 oz. silver and $6 gold per ith a little lead. Development is scattered over a number of different including 20 shafts from 20′ to 600′ in depth, and a 3,500′ tunnel. Has and electric power, a 10-stamp mill and a 150-ton concentrator. Presum- dle.

ADELPHIA COPPER & GOLD MINING, **MEXICO.**
ILLING & SMELTER CO.

lice: 507 Drexel Bldg., Philadelphia, Pa. Mine office: Ameca, Jalisco, Employs circa 50 men. Edwin F. Hall, president; Dr. S. C. Runkel, esident; Francis J. Fee, secretary; Josiah G. Williams, treasurer; A. F. eneral manager; J. A. Hall, superintendent; Ernest Koch, mill superin- t; Braulio Medina, mining captain. Organized 1900, under laws of New , with capitalization $3,000,000, shares $1 par.

nds, 73 hectares, near San Martin Hidalgo, including La Perla, La Fé, ncha, San Vicente, Ajax and other mines. Property shows veins of 3′ to 25′ carrying auriferous and slightly argentiferous chalcopyrite. San Vicente 12 miles southeast of Ameca, with circa 600′ of workings, is claimed to 00,000 tons of ore blocked out, and has a steam hoist and air-compressor

installed 1907. La Fé mine is said to show ore up to 30% in copper
Ajax mine shows a 12′ vein, estimated to average 7% copper, 2 oz
$20 gold per ton, which is considered excessive. La Estrella del
is opened by a 260′ tunnel. The property as a whole has 8 shafts, o
average depth, with a total of about 8,000′ of workings. Equipme
a 25-ton Elspass mill, 25-ton lixiviation plant and a 30-ton concentra

PHILADELPHIA COPPER MINES CO. **NEW**

Office: 206 Stephenson Bldg., Milwaukee, Wis. Mine office:
Grant Co., N. M. J. W. McAlpine, president; E. W. F. ReQua, vice
A. E. Johnson, secretary and treasurer; preceding officers, Wm. Schr
Keough and G. M. Petty, directors; B. F. Baker, superintendent; F
auditor. Organized circa January, 1907, under laws of New Me
capitalization $500,000, shares $1 par.

Lands, 5 claims, partly timbered, on the Santa Fé railroad in t
mining district, near Hanover, carrying a limestone and porphyry
25′ to 75′ width, showing copper carbonates and sulphides, latter m
copyrite, with some bornite and occasional chalcocite, principal value
cupriferous pyrite. Mine, opened 1880, shipped some good ore, a
to have paid its way in the past, under various managements.
numerous opencuts and 4 shafts, deepest 75′, 100′ and 150′, all in
tunnel showing chalcopyrite up to 6% in copper tenor, with gold
values. Selected surface ores assay circa 2% copper, 2 oz. silver
gold per ton. Is developing at rate of 75′ to 100′ per month. Ha
power, engine house, smithy and sorting shed, and plans a new
equipment. A railroad runs 1,500′ from shaft. Made several small
1907. Employed circa 35 men at last accounts.

PHILADELPHIA MINING & MILLING CO. **NEW**

Dead. Lands sold to Hillsboro Consolidated Mines Co., a fr
merly at Hillsboro, Sierra Co., N. M.

PHILADELPHIA-SEARCHLIGHT GOLD & COPPER MINING CO.

Office: 810 Witherspoon Bldg., Philadelphia, Pa. Mine office:
light, Lincoln Co., Nev. John C. Groome, president; Jos. W. Sharp
president; J. M. Stewart, secretary and treasurer; preceding officers
M. Popham, E. C. Knight, Jr., Richard W. Meirs and Chas. Wheeler,
W. H. Bainbridge, superintendent. Organized under laws of Ariz
capitalization $5,000,000, shares $1 par; issued, $1,000,000.

Lands, 23 claims, 1 fractional, area 450 acres, in the Sunrise
miles northeast of Searchlight. Has a 356′ vertical shaft, with cross
bottom showing several veins of 3″ to 4′ width, carrying aurife
argentiferous copper ore, of fair tenor, with quartz gangue. Has s
gasoline power, with necessary mine buildings. Employs circa 15 me

PHILLIPS RIVER GOLD & COPPER CO., LTD. **AUS**

Office: Salisbury House, London Wall, London, E. C., Eng.
works office: Ravensthorpe, Phillips River Goldfield, Western Australi
Kaufman, chairman; E. Protheroe Jones, secretary; G. C. Klug, gen
ager; Fred W. Morgan, mine manager. Organized Jan. 6, 1906, under
Great Britain, with capitalization £100,000, shares £1 par. Owns 44,3
of Mount Cattlin Copper Mining Co., Ltd.

Lands, 247 acres, apparently held under lease and option, in the
thorpe division of the Phillips River Goldfield, circa 32 miles from Po
toun, including the Mount Benson and Mount Desmond mines, and
stone quarry of fluxing ore. The Mount Cattlin mine was sold, N
1906, for £100,000. The Mount Benson mine has a 200′ shaft, but
developments are at the Mount Desmond-Elverdton group, having
263′ and 267′, with development under way on the 250′ level, this

cludes a steam pump, 14 Cleaves jigs and 4 Woodbury jigs. While th is idle, the mill is operated, day-shifts only, on rock from the Medor of the Keweenaw Copper Co.

PHOENIX & EASTERN SMELTING & REFINING CO. ARI

Works office: Phoenix, Maricopa Co., Ariz. Geo. F. Goerner, manager. Late 1906 was said to plan building a 300-ton smelter, in vici Phoenix, but no such smelter built, and probably no prospect of bu Ralph Jacoby was one of the organizers, hence the company is regarde suspicion.

PHOENIX GOLD & COPPER MINING CO. NEV

Office: 218 La Salle St., Chicago, Ills. Mine office: Tenabo, Land Nev. Organized circa 1907. Property is the Howie lease of the Phoeni on lands of the Gold Quartz Mining Co., said to have a shaft showing a with ore assaying up to $100 per ton in combined copper, silver and gold

PHOENIX MINING CO. C

Office: Valparaiso, Chile. Mine office: Tocopilla, Antofagasta, Organized Apr. 18, 1905, under laws of Chile, with capitalization 250,000 shares 100 pesos par.

PHOENIX MINING CO. U

Mine office: Bingham Canyon, Salt Lake Co., Utah. H. A. Gel superintendent. Mine, near the Utah-Apex and Yampa, is opened by 4 t one, a 2,700′ crosscut adit, showing a vein of 7′ to 14′ width, carrying silv ore. Smelting ore assays 35 to 40% lead and 10 oz. silver per ton, and ore, running 10% lead, with small silver values, makes a 40% lead conce after putting 5 into 1. Has a 200-ton mill, on Carr Fork, with electric completed 1908. Employs circa 40 men.

PHOENIX MINING, SMELTING & DEVELOPMENT CO., LTD. BRITISH COLU

Office and mine: Phoenix, Boundary district, B. C. Julius Carson, dent; A. F. Geddes, vice-president; W. S. Longhurst, secretary; Wm. D treasurer; preceding officers and M. J. Carson, directors. Organized 1908, under laws of British Columbia, with capitalization $1,000,000, sha par. Lands, 2 claims, one fractional, in the Wellington camp, circa 3 from Phoenix, having a 60′ shaft showing auriferous copper ore. Co plans driving a tunnel.

PHOENIX MINING SYNDICATE. WASHIN

Office: Seattle, Wash. Mine office: Berlin, King Co., Wash. Lan clude the Mona group, east of Miller river, 2½ miles from a railroad, sh a 60′ vein, carrying a 20′ paystreak of low grade chalcopyrite, opened shaft of 50′ and by tunnels of 80′, 230′ and 700′. Presumably idle.

PICACHO BLANCO MINING CO. ARI

Letter returned unclaimed from former mine office, Morristown, Ma Co., Ariz. M. E. Waldstein, president; T. O. Otis, secretary and tre Is a consolidation of the San Domingo Gold & Copper Co. and Exposition ing Co. Capitalization $5,000,000, shares $1 par. Lands, 31 claims, in copa and Yavapai counties, Arizona. Has a 400′ main shaft, with free-m gold ores claimed to average $22 per ton. Has a 15-stamp mill and a cyanide plant. Idle several years and apparently moribund.

MINAS PICACHO y CAMPO RICO. MEX

Mine office: Bavispe, Moctezuma, Sonora, Mex. Corella & Hone, ow B. J. Hone, manager. Ores carry copper, gold, silver and lead. Has power, arrastras and a small adobe smelter. Employ circa 40 men.

PIC COPPER & GOLD MINING CO. OF LAKE SUPERIOR, LTD. ONTA

Dead. Formerly at Port Arthur, Thunder Bay district, Ont.

T CREEK DEVELOPMENT CO. **OREGON.**
ine office: Grants Pass, Josephine Co., Ore. Lands, on Picket Creek, are show several veins of 3' to 7' width, carrying auriferous copper ore of nde. Early 1908 planned development by tunnel.

MONT COPPER MINING & SMELTING CO. **VIRGINIA.**
lice: 320 Broadway, New York, N. Y. Letter returned unclaimed from mine office, Elkton, Rockingham Co., Va. Morris D. Brown, president; . Blauvelt, vice-president; E. Porter Emerson, secretary and treasurer; Brown, general manager. Organized 1901, under laws of New Jersey, apitalization $2,000,000, shares $100 par, $30 paid in.
ands show 3 fissure veins, carrying occasional native copper and sulphide with claimed average values of 6% copper, 10 oz. silver and $15 gold n. Veins are said to be persistent and traceable for about a mile, with ical conditions much the same as at the High Top mine, adjoining. Idle years and apparently moribund.

RAS HERMANOS. **CHILE.**
ffice and mine: Chañaral, Antofagasta, Chile. Property is the Esplora- mine, situated in the northern limits of the department of Chañaral, at oot of the Cordillera Encantada. Lands show 3 parallel veins, with an gate of about 8 meters width. Mine, opened to vertical depth of 160 s, has produced a large quantity of 8 to 12% ore, and is estimated to on surface, 75,000 tons of ore of 7 to 8% copper tenor. Property lacks portation facilities and is greatly hampered by high carriage charges. t, 1903, was 2,485 metric tons of ore, averaging 19.72% copper, equivalent 80,346 lbs. fine copper. Apparently if given adequate transportation ties and good management, this should make one of the best copper in Chile.

PAÑIA MINERA PIEDRAS VERDES y ANEXAS. **MEXICO.**
)ffice and mine: Alamos, Sonora, Mex. Angel Almado, president; Joaquin ange, superintendent. Lands, circa 15 miles northwest of Alamos, and 2 north of the Rio Mayo, include the Piedras Verdes, Union and Sonora s, showing a mineralized zone of about one mile width and 4 miles length, veins outcropping 10' to 40' in width, carrying considerable oxidized ore gh grade, and occasional native copper in masses of considerable size. lopment is by a 350' shaft and a 375' tunnel. Has steam power and a matting furnace, and shipped, 1902, small quantities of matte carrying 40% copper, 20% lead and 200 oz. silver per ton. Presumably idle.

DRAS VERDES MINING CO. **MEXICO.**
Office: Fuerte, Sinaloa, Mex. Has argentiferous copper ores, slightly de ed by tunnel. Idle.

DRAS VERDES MINING CO. **MEXICO.**
Mine office: Sunqui Grande, Hermosillo, Sonora, Mex. Geo. M. Cochran intendent. Presumably idle.

CE MINING CO. **COLORADO.**
Dead. Formerly at Central City, Gilpin Co., Colo.

EDALE COPPER CO. **AUSTRALIA.**
Mine office: Stanthorpe, Queensland, Australia. Mine has [illegible] ly very shallow, showing self-fluxing argentiferous copper and [illegible] a mill, built 1907, with magnetic separation process, giving [illegible] ntrates. Smelter has a reverberatory furnace, and addition [illegible] ace is contemplated. Production, November, 1907, was 147 [illegible] melted to matte, carrying 14,000 lbs. copper and 2,928 [illegible] 1907, is estimated at 160,000 lbs. fine copper.

E HILL MINES, INC.
Office: 82 Beaver St., New York, N. Y. Mine office: [illegible]

Vt. N. M. Macdonald, president; H. H. Knox, vice-president; John H
secretary and treasurer; Harry G. Hunter, superintendent; preceding
and D. S. Conant, directors. Organized Jan. 9, 1906, under laws of V
with capitalization $200,000, shares $100 par. Annual meeting, second
in January.

Lands, 101 acres, freehold, in the Corinth district, 14 miles from B
Maine railroad, showing mica-schist carrying lenses of chalcopyrite
inated in pyrrhotite, of 3.5% estimated average copper tenor. Propert
old mine, worked at intervals during the Nineteenth Century.

Equipment includes a 75-h. p. steam plant, held in reserve, and a
plant with 20-h. p. and 80-h. p. gas engines and a 25-kw. electric ge
20 h. p. being used at the mine and 80 h. p. at the mill. Fuel is pea-c
wood. Buildings include necessary mine structures and 4 houses for wo

The wooden concentrator, of 6,600 square feet area, has a 9x15"
crusher, 3 rolls and 2 magnetic separators, with roaster and dryer.

Production has been as follows: 131,911 lbs. fine copper in 1905;
lbs. copper and 1,698 oz. silver in 1906; 425,367 lbs. copper and 2,
silver in 1907. Product of latter year was secured from 5,951 tons of ore
yielding an average extraction of 3.21% copper, and from 624 tons of s
ore shipped. Company contemplates building a 100-ton smelter. Sus
operations November, 1907.

NEGOCIACION MINERA PILARES DE TERAS. MI

Mine office: Pilares de Teras, Sonora, Mex. Francisco H. García,
manager; Alberto C. García, superintendent. Is primarily a silver mine,
ing small values in copper, gold and lead, opened by a 1,400' tunnel a
main shaft. Has steam power.

PILOT-BUTTE COPPER MINING CO. MON

Office: 516 Colby-Abbott Bldg., Milwaukee, Wis. Mine office:
Silver Bow Co., Mont. Wm. P. Jahn, president and general manager; E
Uhrig, vice-president; Geo. P. Meyer, secretary; Geo. F. Brumder, tre
Arthur C. Uihlein, assistant secretary. Organized 1907, under laws of
with capitalization $5,000,000, shares $5 par.

Lands, 1 fractional claim, area 10.19 acres, with average width
and length of 1,405', adjoining the Berlin claim of the North Butte, a
posed to be traversed by several veins having an estimated combined w
135', all said to apex on the Pilot claim, these including extensions of
of the Berlin. Development is by a 515' three-compartment shaft, wit
cuts east and west on the 500' level, in search of the Elm Orlu vein of
iferous copper ore. Has a 50-h. p. electric hoist and Ingersoll-Rand
pressor, actuated by 100-h. p General Electric motor, taking power fr
Madison River Power Co. Property, though very small, is well locat
of considerable promise, and the officers and leading shareholders are
the most substantial business men of Milwaukee.

PILOT KNOB COPPER MINING CO. NE

Dead. Formerly in Nevada.

PILOT RANGE MINING CO. NE

Dead. Lands owned, 1908, by Mrs. Fermenia Sarrias. Former office
60 State St., Boston, Mass. Lands were 35 claims, circa 7 miles from
Formerly at Luning, Esmeralda Co., Nev.

PILOT RANGE MINE. NE

Mine office: Luning, Esmeralda Co., Nev. Mrs. Fermenia Sarrias,
and general manager; Fermin Arrega, superintendent. Lands, 57 claim
1,140 acres, with 160 acres miscellaneous lands, in the Santa Fé district,
ing syenite and limestone, with 57 reported ore bodies, this number n
ously matching the number of claims, with 5 ore bodies under develop

traceable 7 miles and to give average assays of 10% copper and 2 per ton from azurite, malachite, bornite and chalcopyrite, which e too high. Development is by tunnels of 60′, 100′, 150′, 150′ and 500′ of workings, estimated by management to show 100,000 tons ith 20,000 tons blocked out for stoping, which estimates are excessive. pment includes a small steam plant and 3 mine buildings. The nearest s the Southern Pacific, 8 miles distant. Property considered promising.

NES DE CUIVRE PILOU, LTD. **NEW CALEDONIA.**

. Formerly at Noumea, Diahot district, New Caledonia.

BUTTE GOLD & COPPER CO. **CALIFORNIA.**

e: care of Vernon L. Clark, Los Angeles, Cal. Letter returned un- from former mine office, Forbestown, Butte Co., Cal. Organized, 1907, ws of Arizona, with capitalization $2,500,000. Property is the Hazel-, idle since 1905, until bought by this company. Has a mill, which g enlarged at last accounts. Idle.

COPPER CO. **ARIZONA.**

. Reorganized, 1905, as Arizona Banner Copper Co. Formerly at ila Co., Ariz. Described Vol. III.

ILL CONSOLIDATED MINING CO. **CALIFORNIA.**

e: 1416-141 Broadway, New York, N. Y. Mine office: Wolf, Nevada J. Frank Mase, secretary and treasurer. Organized under laws of . Has a copper ledge, claimed to be 100′ feet wide, carrying mal- zurite, bornite, chrysocolla and native copper, with a gold vein on the and an auriferous gossan, opened by a two-compartment main shaft. eral years.

OUNTAIN COPPER CO. **ARIZONA.**

er returned unclaimed from former office and mine, Globe, Gila Co., . J. Cole, Elmer Long, J. H. Lucas, J. F. Hatrick and Wm. Pohl, . Organized Apr. 6, 1907, under laws of Arizona, with capitalization shares $1 par. Lands are the Ava group, 5 claims. Idle and ap- moribund.

ALE COPPER SYNDICATE, LTD. **AUSTRALIA.**

e: 24 Copthall Ave., London, E. C., Eng. Mine office: Mirani, nd, Australia. E. O. Chudleigh, secretary; G. Lloyd Owen, mine man- rganized May 1, 1906, with capitalization £17,225, in 11,000 preference 0 ordinary shares of £1 par each, and 4,500 shares of 1s. par, prefer- es taking all profits up to 100%, with interest at 6% per annum, after l shares rank alike.

ÑIA MINERA PINTADOS. **CHILE.**

e: Santiago de Chile. Mine office: Tarapacá, Tarapacá, Chile. Or- Dec. 23, 1905, under laws of Chile, with capitalization 6,000,000 pesos, pesos par.

COPPER CO. **NEW MEXICO.**

e: 9 Bartles Bldg., Iola, Kansas. Mine office: Santa Rita, Grant Co., Geo. A. Bowlus, president; F. S. Bennett, secretary and general man- rganized July, 1902, under laws of South Dakota, with capitalization 0, shares $1 par. Lands, 8 claims, area 121 acres, in the Central dis- owing 4 veins, said to average 20′ width and carry carbonate and ores assaying 2.5 to 12% copper, 3 to 10 oz. silver and $2 to $400 gold opened by shafts of 65′, 75′ and 140′. Idle several years.

CREEK COPPER CO. **ARIZONA.**

. Title changed, circa 1902, to Arizona & Hancock Mining Co. For- Florence, Pinal Co., Ariz.

CREEK COPPER MINING CO. **ARIZONA.**

e and mine: Globe, *Gila Co., Ariz.* *Thos. P. Kelly*, president. Organ-

ized Nov. 21, 1906, under laws of Arizona, with capitalization $1,000,000, $1 par. Lands, 9 claims, near the Arizona National and Globe Stand Pinto Creek, said to have about one-half mile of workings.

PINTO CREEK MINING & SMELTING CO. ARI

Office: 402 German American Bank Bldg., St. Joseph, Mo. Mine Globe, Gila Co., Ariz. Employs circa 40 men. Thos. G. Cockrill, pre Chas. Riemenschneider, vice-president; Grant S. Watkins, secretary; Castle, treasurer; preceding officers, H. E. Bragg, J. Berger and Geo. D. directors; G. P. Fuller, superintendent. Organized Dec. 11, 1896, unde of Arizona, and capitalization increased, 1906, to $1,250,000, shares $1 pa

Lands, 36 claims, area circa 700 acres, showing granite and schist 6 fissure veins, in granite, of reported average width of 3′ to 6′, of wh gives considerable promise, carrying sulphide ores assaying 4 to 12% circa 5 oz. silver and $2 to $10 gold per ton. The mine has shafts of 7 570′, and 8 tunnels, shortest 100′, and 2 longest 900′ and 1,100′, the low nel being connected with the upper workings. The main tunnel is driven with air-hammer drills, said by the company to be doing doub work of piston drills at half the cost, which seems almost too good to b Main development is on the Yo Tambien claim, where the 570′ shaft s promising body of sulphide ore. The Manitou claim has a 70′ shaft, tunnels of 1,500′ aggregate length.

Mining equipment includes a gasoline hoist and a 6-drill Sulliv compressor, and there is an aërial tram between the mine and mill.

There is an old 10-stamp mill, and a concentrator, formerly of 3 daily capacity, overhauled and rebuilt, 1907, to 100-ton size, with the tion of $14,000 worth of new machinery, including a Hancock jig. Th ton mill requires a force of 3 men only, as against 8 in the old 30-ton mi is planned as the first unit of a 600-ton mill.

The management of this company deserves credit for great pe ance. Large sums have been expended, and indications favor the makin mine. Work was resumed March, 1908.

PIONEER COPPER & SILVER MINING CO. CALIFO

Office: care of J. H. Platner, president and general manager, Reno, John Holley, treasurer. Organized February, 1907, with capitali $1,500,000. Lands, 15 claims, 11 said to carry silver and 4 to carry g Inyo county, California. Mine, said to have circa 6,000′ of workings, producer for about 15 years, until 1879.

PIONEER WALKER LAKE GOLD & COPPER MINING CO. NEV

Office: care of J. F. Maier, president, Los Angeles, Cal. Letter re unclaimed from former mine office, Yerington, Lyon Co., Nev. Col. Diss, vice-president; Ferdinand K. Rule, Jos. Erzenberger, Samuel P. D H. H. Wallace, O. H. Kiesker, C. E. Killan and H. Hawgwood, directors. ized 1906, under laws of Arizona, with capitalization $1,000,000. La claims, 4 miles north of Yerington, said to show a gossan of about 25′ a width, carrying copper carbonates.

PISHMINSKO-KLUCHEVSKI WORKS. RU

Mine office: Upper Issetzk, Perm, Russia. Count Stenbok-Fermor, Production, 1905, was 868,188 lbs. fine copper.

PITKÄRANTA KOPPARBRUK. FINL

Office: care Russian Imperial Bank, owner, St. Petersburg, Russia. office: Pitkäranta, Viborg, Finland. Lands, circa 10,000 acres, mainly wooded, near Lake Ladoga. Mine, opened circa 1820, was operated st until about 1903, making an average annual production of circa 750,00 fine copper during the last decade of operation. Has been under pr ownership, which is practically that of the Russian government, since 189

Lands carry several ore bodies, but the one developed is a 15′ bed of ru," which is a granular mixture of augite, garnet and other ferro- esian silicates, impregnated with chalcopyrite, in veinlets. This ore body, h dips to the south, at 40° to 50°, has been opened at intervals for a th of about 1½ miles. To the eastward the ore occurs as bunches, up veral pounds in weight, and at this end of the workings the ore body parated into 5 sections, the footwall bed of about 70′ width carrying y disseminated chalcopyrite in "skarn," overlaid by a 2′ to 3′ layer of en material, followed in turn by 3′ of barren schist, succeeded by a cuprif- s bed of about 20″ thickness, carrying somewhat argentiferous copper sul- es. Property also has iron ore, and is said to have indications of tin. The has a small smelter. Idle since circa 1903, but said, June, 1907, to have optioned to a British syndicate.

RIVER GOLD, SILVER & COPPER MINING CO. **CALIFORNIA.**

Dead. Formerly at Redding, Shasta Co., Cal.

TSBURG & ARIZONA MINING CO. **ARIZONA.**

Mine office: Johnson, Cochise Co., Ariz. Lands include the Manila mine, a double compartment shaft, planned to be sunk 400′, showing a promis- vein of high-grade ore. Has a steam plant, with hoist, air-compressor and ips. Presumably idle.

TTSBURGH & BOSTON COPPER CO. **MICHIGAN.**

Dead. Property sold to Tamarack Mining Co. Was the first dividend- er among Lake Superior mines. Formerly at Phœnix, Keweenaw Co., h. Fully described, under title Cliff mine, Vol. II.

TTSBURG & CHIRICAHUA DEVELOPMENT CO. **ARIZONA.**

Mine office: Paradise, Cochise Co., Ariz. Lands, 16 claims, in the Chirica- Mountains. Idle some years.

TTSBURG CONSOLIDATED MINING CO. **UTAH.**

Dead. Formerly at Alta, Salt Lake Co., Utah. Described Vol. VI.

TTSBURG COPPER CO. **NEW MEXICO**

Mine office: Clayton, Union Co., N. M. Lands, shortly east of the Rohr- dder Mining & Development Co., are developed by a 350′ tunnel.

TTSBURG COPPER MINING & REDUCTION CO. **ARIZONA.**

Office: 300 Heist Bldg., Kansas City, Mo. Capitalization, $150,000,000. as a swindle, promoted by Theodore Stegner, a notorious crook. Company eld 40 acres of alleged copper mining ground in Box Cañon, on the Bill illiams Fork river, about 50 miles from Congress Junction, Arizona, and also laimed to own other lands, none of which can be located. Company's capi- alization is preposterous, and the shares are absolutely worthless. Stegner as done time before, and should be locked up permanently.

TTSBURG & DULUTH DEVELOPMENT CO. **ARIZONA.**

Dead. Succeeded, October, 1904, by Pittsburg & Duluth Mining Co. For- erly at Bisbee, Cochise Co., Ariz.

PITTSBURG & DULUTH MINING CO. **ARIZONA.**

Dead. Was merged, circa 1907, in Superior & Pittsburg Mining Co. For- erly at Bisbee, Cochise Co., Ariz. Fully described Vol. VI.

PITTSBURG-ELY COPPER CO. **NEVADA.**

Office: 721 Symes Bldg., Denver, Colo. Mine office: Ely, White Pine Co., Nev. B. P. Morse, president; Hon. Harry C. Riddle, vice-president; J. A. Varney, secretary; Frank Straub, treasurer and trustee; preceding officers and Edwin A. Kistler, directors. Organized January, 1907, under laws of Arizona, with capitalization $5,000,000, shares $5 par. Lands, circa 350 acres, in 2 groups, including the Keyboard group, 6 claims, area 120 acres, near the Key- stone claim of the Nevada Consolidated. Another group of 10 claims, area 200 acres, lies to the north, and a third small group is near the Cumberland-

Ely. The Keyboard group has a 60′ shaft, sunk 1907, claimed by company to be in the ore formation, which may mean much or little. The Keyboard group is considered promising, but apparently company has done more advertising than development. Employed 3 men at last accounts.

PITTSBURG & GREENWATER COPPER CO. CALIFORNIA.

Office: care of L. P. McGarry, president and general manager, Rhyolite, Nev. Mine office: Greenwater, Inyo Co., Cal. Organized October, 1906, under laws of Arizona, with capitalization $2,000,000. Lands, 16 claims, known as the Iron Mask group, near Resting Springs, about 35 miles south of Greenwater. Was promoted, for purely stock-jobbing purposes, by the notorious Dr. J. Grant Lyman. Idle and presumably moribund.

PITTSBURG & HECLA DEVELOPMENT CO. ARIZONA.

Dead. Formerly at Bisbee, Cochise Co., Ariz. Fully described Vol. V.

PITTSBURG & HECLA MINE. ARIZONA.

Office and mine: Bisbee, Cochise Co., Ariz. Thos. Tate, manager. Is idle, except for annual assessment work.

PITTSBURG-IDAHO MINING CO. IDAHO.

Dead. Was succeeded by Pittsburg-Idaho Mining & Milling Co. Formerly at Greer, Nez Perce Co., Idaho. Fully described Vol. VI.

PITTSBURG-IDAHO MINING & MILLING CO. IDAHO.

Office: Kamiah, Idaho. Mine office: Greer, Nez Perce Co., Idaho. Jas. F. Bridwell, president; Daniel Laverty, vice-president and general manager; Hugh Laverty, secretary and treasurer; E. E. Krengel, engineer; preceding officers, Fred Worrell, Otto Gorke, Jas. Laverty, William S. Pitman and Patrick Laverty, directors. Organized January, 1903, under laws of Idaho, with capitalization $1,000,000, shares $1 par.

Lands, 19 claims, area 380 acres, in the Lo Lo district, said to show 6 contact veins, between gneiss and quartz-porphyry, of which 2, of 50′ to 100′ width, under development, carry cuprite, malachite, bornite and chalcopyrite, giving assays up to 12% copper, 14 oz. silver and $20 gold per ton. Has about 1,700′ of workings, including pits and shafts, deepest 180′, with tunnels of 40′, 290′ and 600′. Has gasoline power and 5 small buildings, and plans a hydro-electric installation, to utilize power from the Clearwater river.

PITTSBURG-JEROME COPPER CO. ARIZONA.

Office: 1219 Park Bldg., Pittsburg, Pa. Mine office: Jerome, Yavapai Co., Ariz. Thomas Houlette, president; Jos. Atkins, vice-president; C. S. Cochran, treasurer; T. D. McDonald, secretary; preceding officers, W. E. Crow, Robt. Stewart, A. C. Spindler and D. M. Clemson, directors; W. A. Edeburn, consulting engineer; D. F. Houlette, superintendent. Organized 1904, under laws of Arizona, and capitalization increased, March 9, 1906, to $3,000,000, shares $1 par; issued, $1,482,699. Annual meeting, first Monday in March.

Lands, 26 claims, area circa 520 acres, lying 2 to 3 miles south of Jerome, a short distance northwest of the Black Hills property and about midway between the United Verde and Equator mines. Development is by the Pittsburg shaft, planned to have been sunk 1,000′, which is said to show, at 250′ depth, argentiferous and auriferous sulphide ore, of about 4% copper [illegible]. Development was hampered by a heavy inflow of extremely acid water.

Equipment includes a 50-h. p. Fairbanks & Morse hoist, good for 1,500′ depth, and an Ingersoll-Rand 2-stage air-compressor. Property was closed down June, 1907, ostensibly on account of differences in the directorate, but perhaps from lack of cash as well.

PITTSBURG-JEROME COPPER & GOLD MINING CO. ARIZONA.

Dead. Succeeded, circa 1904, by Pittsburg-Jerome Copper Co. Formerly at Jerome, Yavapai Co., Ariz.

TSBURG-MAYER MINING CO. **ARIZONA.**

Mine office: Mayer, Yavapai Co., Ariz. Louis D. Hall, general manager, at last accounts.

TSBURG MINING & MILLING CO. **IDAHO.**

Dead. Formerly at White Bird, Idaho Co., Idaho.

TSBURG & MONTANA COPPER CO. **MONTANA.**

Office: 1124 Farmers Bank Bldg., Pittsburg, Pa. Mine and works office: te, Silver Bow Co., Mont. Employs circa 250 men. J. H. Reed, president; ding officer, T. H. Given, J. W. Friend, Hay Walker, Jr., and D. C. ole, directors; R. T. Rossell, secretary and treasurer; Oscar Rohn, manager. nized July 9, 1902, under laws of West Virginia, with capitalization ,000,000, shares $100 par. Has authorized a $3,000,000 bond issue, at 6%; red by trust deed. The company has a considerable floating indebtedness, h apparently is being financed by the Pittsmont Copper Co., organized for purpose. Annual meeting, first Monday in August.

Lands, 46 claims, area 850 acres, also 634 acres miscellaneous lands, giving holdings of 1,384 acres, in the Butte, Helena, Elk Horn and Greenhorn icts of Montana. Principal property is the main tract of 260 acres, lying e flat east of Butte, including the McQueen placer and adjoining claims, erly owned by Franklin Farrell.

Owing to the great depth of overburden, the solid ledge was not reached a depth of several hundred feet, and sinking was difficult and costly, g to the existence of considerable quicksand above the ledge. The erty carries 4 veins, of 2′ to 12′ estimate average width, which presumably continuations of the veins of the Butte & Boston. Development is by 2 ts, known as Nos. 2 and 3, each of 1,240′ depth, with a 300′ winze below bottom level, the mine having about 8 miles of workings. No. 2 shaft has gallon electric pumps on the 700′ and 1,200′ levels, and the shafts are nected with a half-mile crosscut on the 1,200′ level. The ore bodies are ll, compared with the big veins to the eastward, but carry good silver es, ore assaying 3.5 to 10% copper and 5 to 12 oz. silver per ton, with ll gold values. The richest ore has been found between the 800′ and 0′ levels, and some ore of 7% copper tenor was stoped on the 180′ level. t-class ore ranges 6 to 8% copper and 8 to 12 oz. silver per ton.

The Swissmont mine, near Elkhorn, Jefferson county, Montana, bought for ,000, shows a large body of low grade sulphide ore, of 1.5 to 3% copper er. This is idle.

The Chamounix mine, near Austin, Lewis & Clark county, Montana, in des the Christina group of 6 claims, and the Fannie Parnell group of 33 ms. This property has considerable development, and has shipped some ntiferous copper ore, but was idle at last accounts.

The company also owns mining claims at Pittsburg, 4 miles from Helena, is & Clark county, Montana, which are idle.

Equipment at the Butte property includes a 2,000-h. p. steam plant and 0-h. p. electric plant, 1,900 h. p. being used at the mine and 700 h. p. at melter. There is a 500-h. p. hoist, good for 1,600′ depth, and a 600-h. p. good for 1,300′, with a 25-drill Nordberg air-compressor, 10-drill Rand mpressor, and 20 power drills.

Buildings include a 38x70′ brick carpenter shop, frame smithy, 2 engine-s, 2 boiler-houses, changing-house, office, laboratory and miscellaneous ings, with a total of about 16 structures. The large office building is ped with a library, reception room, billiard room and café.

The property has about 3 miles of railroad track, connecting the various s and works. The lands, in two tracts, are surrounded by high board s.

The reduction plant, known as the Pittsmont works, include a 250-ton concentrator, built 1907, near the smelter.

The Pittsmont smelter does a limited custom business, in addition to treating the company's own ores. The furnace building, with room for 4 cupolas, has a 250-ton blast-furnace, added 1908, and an old 150-ton blast furnace, which it is planned replacing by a new 250-ton furnace. The small cupola is a Garretson pyritic furnace, remodeled by Mr. Baggaley, the former manager, and gave considerable trouble in operation, on semi-pyritic smelting. The converter department has 2 stands, with 96x156" shells, and there also are 2 experimental Baggaley converters, of smaller size, not in use. Product is blister copper, averaging circa 96% copper, 200 oz. silver and 3.5 oz. gold per ton, sent for electrolytic refining to the Nichols Copper Co.

Production, 1905, was 790,600 lbs. fine copper, 81,911 oz. silver and 1,4[illegible] oz. gold, secured from 11,000 tons of ore smelted, giving average returns of 3.6% copper, 7.5 oz. silver and $2.50 gold per ton. The smelter was closed Apr. 14, 1906, but resumed work in 1907, and November, 1908, was said to be smelting circa 250 tons of ore daily, of which about 50 tons was first class and 200 tons was second class ore. Property is considered valuable, though not up to the average of the Butte camp in quantity or quality of ore.

PITTSBURG & MOUNT SHASTA GOLD MINING & MILLING CO. CALIFORNIA.

Office: 424 Fifth Ave., Pittsburg, Pa. Letter returned unclaimed from former mine office, Redding, Shasta Co., Cal. B. H. Scott, president; Dr. J. R. Phillips, vice-president; J. S. Parish, secretary; T. V. Scott, treasurer. Organized 1903, under laws of West Virginia, with capitalization $500,000, increased later to $1,000,000, shares $1 par.

Lands, 9 claims, partly patented, area 170 acres, known as the Bennington group, in the Flat Creek district, north of Redding, said to have been bought for $18,000 cash and $60,000 shares. Company claims to have expended about $50,000 in development and equipment. Property mortgaged, previous to 1907, for $13,300. Mine has a 280' crosscut tunnel and 2 other tunnels, showing auriferous and argentiferous copper ore of varying tenors. Has a carpenter shop, smithy, boarding house and 3 bunk-houses, with electric power. Shipped, previous to 1907, circa 100 tons of selected ore, running $3 to $[illegible] gold and averaging about 10 oz. silver per ton. Idle.

PITTSBURG-NEW YORK COPPER MINING CO. MONTANA.

Office: care of W. H. Lindsay, secretary and treasurer, Butte, Mont. Mine office: Elkhorn, Jefferson Co., Mont. Alexander Johnson, president; Thos. S. Killgallon, vice-president; W. J. Dawson, superintendent. Organized under laws of Montana, with capitalization $1,250,000, shares $1 par. Lands, 5 claims, adjoining the Park Copper Co.

PITTSBURG-OAXACA MINING CO. MEXICO.

Office: 119 Farmers Bank Bldg., Pittsburg, Pa. Mine office: San Bartola Coyotepec, Centro, Oaxaca, Mex. W. J. Burke, president; P. J. Kane, vice-president; M. J. Gannon, secretary and treasurer; W. H. Baird, manager. Organized 1904, under laws of Delaware, with capitalization $1,000,000, shares $1 par.

Mine, said to have circa 6,000' of workings, with 50,000 tons of ore blocked out, has a 5' vein, carrying mainly gold values, with some copper ore ranging 5 to 9% in tenor. Property is served by the Mexican Southern railway, and has a 25-ton mill. Was raising money, at last accounts, for alleged purpose of installing a $150,000 machinery equipment. Advertising makes exaggerated claims. Is said to employ circa 50 men.

PITTSBURG & SONORA DEVELOPMENT CO. MEXICO.

Office: care of Hon. W. G. McDonald, Douglas, Ariz. Mine office: Cur-

Moctezuma, Sonora, Mex. Holds direct title to property through a Mexican poration known as the Quatro Grande. Lands include the Estrella de la Plata e, near Cumpas, also claims circa 18 miles south of Douglas. Presumably

TSBURG & UTAH GOLD, SILVER, COPPER & LEAD MINING CO. **UTAH.**

Mine office: Ophir, Tooele Co., Utah. Idle.

TTSMONT COPPER CO. **MONTANA.**

Office: 1124 Farmers Bank Bldg., Pittsburg, Pa. Mine office: Butte, ver Bow Co., Mont. Was organized, 1908, as a holding company for the ittsburg & Montana Copper Co., presumably for the purpose of providing eded funds.

ITTSMONT SMELTER. **MONTANA.**

Owned by Pittsburg & Montana Copper Co.

IZARRO COPPER MINING CO. **NEW MEXICO.**

Dead. Was a swindle, put out by the Financial Security & Trust Co., of nver, which also promoted the Spanish Lost Bullion Mines, Geronimo Copper ining Co. and Blanca Copper Mining Co. Formerly at Silver City, Grant , N. M.

LACERVILLE COPPER MINING & REDUCTION CO. **COLORADO.**

Mine office: Placerville, San Miguel Co., Colo. Organized circa May, 7, under laws of Colorado, with capitalization $500,000, by A. B. Cooper, F. Margowski and L. L. Knutson. Presumably is successor of Placerville d & Copper Mining Co.

LACERVILLE GOLD & COPPER MINING CO. **COLORADO.**

Mine office: Placerville, San Miguel Co., Colo. W. K. Johnson, president. anized circa 1903, with capitalization $1,000,000, shares $1 par. Lands, 8 ms. Presumably succeeded, 1907, by Placerville Mining & Reduction Co.

LAKALNITZA MEDNA PLANINA. **BULGARIA.**

Office: care of M. Mavrokordato, owner, Constantinople, Turkey. Mine ce: Plakalnitza, Vratza, Bulgaria. Lands are sundry claims, held as a cession from the Bulgarian crown, showing bornite and a little chalcopyrite, in dolomite. Copper mines were worked in this vicinity by the nans. Idle.

LANET COPPER MINING CO. **ARIZONA.**

Office: 74 Broadway, New York, N. Y. Mine office: Planet, Yuma Co., z. J. Stanley Jones, president and general manager; Chas. S. Barton, vice sident; W. B. Storer, secretary and treasurer; H. L. McCarn, superintendent. anized Aug. 14, 1902, under laws of Arizona, with capitalization $1,500,000, res $10 par; issued, $1,120,000. State Street Trust Co., Boston, registrar transfer agent. Annual meeting, in May.

Lands, 25 claims, area 500 acres, also 40 acres in millsites, in the Hassayar trict, on the south side of Bill Williams Fork river, 12 miles east of the orado river. Property shows about 50 exposures of ore, with 2 ore zones, arently metamorphic contact deposits, having diorite on the footwall, and l by sedimentary shales and impure limestone, much altered by intrusive ptives, the veins carrying a heavy iron capping, mainly of hematite, for tance of 3,000', averaging about 30' in thickness and up to 200' in sh parently the gossan is of workable grade, and it is estimated that the y shows circa 1,000,000 tons of 60% iron ore. The main ore zone, for best 2,700', ranges up to 200' in width, carrying oxidized and sulphide per, estimated to average 7 to 8% copper and 50 cents gold per ton, ces of silver, but apparently the workable portion of the vein is width. The vein is very flat, dipping about 15° only.

Development is by 2 incline shafts, deepest 800', giving

365', showing ore of 5 to 12% copper tenor, and by 12 vertical pits and sh of 25' to 325' depth, and by 8 tunnels, longest 225', with total working 4,000', estimated to show 100,000 tons of ore, with 75,000 tons blocked ou stoping. The sulphide zone has not been reached, as yet, by any worki which is an indication of strong and persistent copper values.

Equipment includes a 75-h. p. gasoline plant with two 15x25" hoists a 5-drill air-compressor. Buildings include a 15x40' frame carpenter-shop, 10 smithy, 2 shafthouses and 3 dwellings.

The mine, opened circa 1864, was worked in a small way until 1874, was reopened 1884, when a 36" blast-furnace was erected. Property was ta over, 1902, by present company, and has been developed steadily, with a s force, since then. The mine produced upwards of $500,000 worth of high gr ore, ranging from 15 to 40% in copper tenor, which was shipped by water t port on the Gulf of California, presumably Guaymas, and transshipped th to Swansea for reduction. A little ore was sent to San Francisco also, and duction is said to have given fair profits, notwithstanding the heavy expe for freight and smelting, and the harassing difficulties caused by various Ind uprisings.

The property has been handicapped by lack of rail connections, but Arizona & California railway is now only 27 miles distant by wagon-road, the company is negotiating for the construction of a branch line from B to Planet. Property considered promising and management good.

PLANT & CALLAHAN MINING CO. WASHINGT

Office: care of J. T. Plant, president, Mora, Minn. Letter returned claimed from former mine office, Conconully, Okanogan Co., Wash. C Williams, vice-president; H. Rines, secretary and treasurer. Organized with capitalization $1,500,000. Lands, 4 claims, including the Anaconda in the Ruby camp, having a 600' tunnel, showing a 20" vein carrying about copper, with high silver values.

PLATA COBRE MINING & TRANSPORTATION CO. ARIZ

Dead. Formerly at Florence, Pinal Co., Ariz. Described Vol. VI.

PLATA COPPER MINING CO.

Dead. Was a swindle, promoted by the notorious Wm. F. Wernse, o Louis.

PLATTE CAÑON MINING CO. WYOM

Mine office: Wheatland, Laramie Co., Wyo. Idle several years.

PLATTE COPPER MINING CO. WYOM

Office: 20 Broad St., New York, N. Y. Letter returned unclaimed former mine office, Encampment, Carbon Co., Wyo. John R. Dixon, presi Wm. C. Ledbetter, vice-president and general manager; Thos. Delaney, tary and treasurer; preceding officers, Philip S. Delaney and A. E. Wilso rectors. Organized 1906, under laws of Colorado, with capitalization $1,00 shares $1 par. Lands, 2 claims, area 40 acres, showing a shear zone of 500' width, carrying ore assaying 5 to 10% in copper tenor.

PLENTY COPPER CO. ARIZ

Dead. A swindle, promoted by the notorious Wm. F. Wernse, of St. Formerly at Pima, Graham Co., Ariz.

PLUMAS COPPER MINING & SMELTING CO. CALIFOR

Dead. Was still-born. Formerly at Taylorsville, Plumas Co., Cal.

PLUMAS MINING, MILLING & SMELTING CO. CALIFOR

Dead. Still-born. Formerly at Taylorsville, Plumas Co., Cal.

PLUTO GOLD & COPPER MINING CO. WYOM

Office: 365 Tenth St., Oshkosh, Wis. Mine office: Dillon, Carbon Wyo. Ole Granberg, president and general manager; H. Thorsgaard, president; H. O. Granberg, secretary and treasurer; E. M. Sanders, sup

; Frank Earle, engineer. Organized Dec. 15, 1902, under laws of Wyo- with capitalization $1,000,000, shares $1 par.
nds, 11 claims, patented, area 220 acres, also a 40-acre millsite, in the Lake district, near the Ferris-Haggarty mine, showing 2 fissure veins in ite, and 2 contact veins between diorite and quartzite, ranging 2′ to 30′ lth, and carrying cuprite, melaconite and copper sulphides, associated nanganese, giving average assays of 1% copper, a trace of silver and $3 er ton, developed by numerous pits of 10′ to 20′ depth, 5 shafts of 55′ ′ depth, and by a tunnel of 1,004′ with circa 2,000′ of underground work- Equipment includes a 40-h. p. steam plant and 3-drill air-compressor. ngs are a 36x40′ machine-shop, 38x20′ carpenter-shop, and 6 other mine ures. Idle except for annual assessment work, but hopes to resume y.

HONTAS COPPER MINING CO. **CALIFORNIA.**

line office: Lewis, Mariposa Co., Cal. David Ross, general manager; J. berts, superintendent. Lands, 150 acres, including the Great Northern in the White Rock district, showing several veins of cupriferous iron etween diorite, vein matter being mainly diabase, usually altered. The pal ore body, about 100′ wide, occurs in a mineral belt up to 1,000′ in , the oxidized zone, circa 100′ in depth, having been a limited producer gh grade ores, many years ago. Development is by tunnel and a 200′ showing ore said to carry 6 to 12% copper and circa $2.50 gold per Has steam power and necessary mine buildings. Ore is shipped, via La e, nearest railroad point, 15 miles distant, to Peyton Chemical Works, at oint, California, and some selected ores were shipped, 1907, to the Tacoma r. Employs circa 20 men. Property considered promising.

HONTAS COPPER QUEEN MINING CO. **ARIZONA.**

lice: Pocahontas, Ark. Mine office: Mayer, Yavapai Co., Ariz. Jos. orhees, president; W. H. Skinner, vice-president and treasurer; T. T. ttorney; A. L. Porterfield, general manager. Organized 1906, under laws izona, with capitalization $1,000,000, succeeding the Big Bug Gold & Mining Co.
nds, 14 claims, 4 miles southeast of Mayer, including the Spar group, , 1908, of the Spar Mining Co., having a 200′ shaft, with a vein up to width, which, under former ownership, shipped 23 carloads of high grade id to have given sufficient returns to former owner to pay cost of par- price and development. Has steam power.

TELLO GOLD & COPPER MINING CO. **IDAHO.**

lice and mine: Pocatello, Bannock Co., Idaho. E. Craanson, president; uheen, secretary; N. M. Eldredge, general manager; Jos. E. Munn, super- ent. Organized Dec. 1, 1902, under laws of Idaho, with capitalization 000, shares 50 cents par.
nds, 7 claims, area 140 acres, in the Fort Hall district, 12 miles east of llo, showing a vein of about 3′ average width, reported to give assays copper and 75% lead (total 115%), with 35 oz. silver and $1 gold per om bornite and chalcopyrite. This evidently is very rich ore, as veins g 115% in metallic values are unusual. From another source it is said iat the ore is mainly of milling grade, with a small paystreak of smelting om which small shipments to the White Knob smelter gave returns of 30% copper and 15 to 18 oz. silver per ton. Development is mainly by unnels, with circa 1,000′ of workings. Presumably idle.

AÑIA MINERA PODEROSA DE COLLAHUASI.

lice: Valparaiso, Chile. Mine office: Collahuasi, Tarapa seo Javier, president; Juan G. Searle, vice-president; Carlos ry; preceding officers, Thompson Matthews, Carlos Gregor

Gustavo Jullian, directors; Robt. Hawxhurst, Jr., mine manager. Organized Apr. 4, 1905, under laws of Chile, with capitalization £240,000, shares £5 par.

Lands, 37 contiguous claims, area 185 hectares, equal to 457 acres, carrying strike of the ore formation for 4,500'. Lands include the Mina Poderosa, which is the principal property, and the San Carlos, Rosario and Condor mines. Lands, located at an extreme elevation of 15,400', on the Bolivian plateau, lie above the timber-line, and are barren of vegetation, with the exception of a fungus, bearing the botanical name of fungi cordillerensi, which forms the local fuel of the district. There are no high hills in the vicinity, lands being on the top of an elevated plateau, surrounded, at a considerable distance, by high peaks of the Andes. There are no running streams, and potable water is scarce. The climate is extremely bleak, winter prevailing 12 months yearly, with snow or hail falling nearly every day in the year. Copper mines in this district were worked under Spanish domination, and previously by the Indians, as shown by the ancient remains of furnaces, fragments of matte, scoria, and tools left in old workings.

The country rock is feldspar-porphyry, stratified and fissile, there being a slight stratification, with dip of about 70° to the westward, with an amygdaloidal diabase running northwest and southeast, dipping with the country rock to the westward, ore bodies occurring in contact with and in the immediate vicinity of the intrusive dykes. There has been considerable disintegration, and overburden covers the rock formation so that latter gives few outcrops, these usually carrying low grade malachite and chrysocolla, or brochantite, gangue being mainly felsitic rock, much decomposed. The Poderosa lode consists of several parallel bodies of partly or wholly decomposed country rock, with considerable faulting, having a general strike of N. 40° W., crossed, at practically right angles, by a secondary set of leaner veins, the master veins being fissures in a shear-zone. Characteristic ores of the Poderosa system are cuprite, melaconite, malachite, chalcocite, covellite, bornite, chalcopyrite, chrysocolla, brochantite, atacamite and tetrahedrite, latter decidedly argentiferous, the ores, as a whole, averaging about 8 to 12 oz. silver per metric ton.

The Poderosa mine, which is the principal property, has a 433' main shaft, with about 7,000' of workings, carrying oxidized ores on the 400' level. Mine has 2 main veins, known as the Poderosa and Portillo, of 3' to 30' width, carrying paystreaks of high grade ore 1' to 20' wide, with average width of about 6', gangue being decomposed quartzose felsite, very soft, requiring heavy timbering, while, unfortunately, the timbering in place is extremely poor. The hanging-wall is well defined, but the ore shades gradually into the altered country rock of the footwall, there being a flucean, usually of 3" to 12", and even up to 4' width, on the hanging, with an occasional flucean on the foot-wall. Main shaft is only 6x8' inside of timbering, and should be cut down to larger size. The shaft is in the hanging-wall, west of the lode, crossing the vein about the fourth level, with 5 levels opened, at only 22-meter intervals, shaft cutting another vein about midway between the fifth and sixth levels, this vein, averaging circa 30" width and dipping toward the main vein, carrying exceedingly high grade ore. The various levels are connected by winzes, with indications that ore will grow richer until the base zone is reached. The mine is quite wet, making about 90,000 gallons of water per day, in the wet season. Estimated ore reserves of the Poderosa mine alone, March, 1907, were 101,600 long tons, with average tenor of 63.66% copper, and circa 10 oz. silver per long ton. These figures, while appearing very high, seem warranted. Equipment of the Poderosa mine is primitive, consisting only of a wooden head-frame, with a 10x15" single Tangye hoist, raising half-ton buckets.

The Rosario mine, northwest of the Poderosa, has a 166' incline shaft, on a 30" vein dipping at about 80°, ore assaying about 15% copper, shaft being

ottomed in the top of the base zone, which shows chalcopyrite, arsenopyrite and
rite. The San Carlos mine, practically an extension of the Poderosa, and
be connected therewith, has a 146′ shaft, showing a 3′ vein carrying ore of
bout 19% average copper tenor. The Condor mine has a 147′ shaft showing
2′ vein, carrying ore giving average assays of about 18% copper. The Cam-
ail mine, a new property, is being opened by shaft. Mine timber used is
regon fir and pine, costing at Antofagasta £9 per thousand feet, with 4d. per
quare foot transportation charges thence to the mine. During the period of
velopment, supplies and ore were hauled 65 miles, over an extremely rough
ad, between Carcote station and the mine, one week being required for the
und trip, but a branch of the Antofagasta & Bolivian railway, building from
lagüe to the mine, was practically completed, at last accounts.

Labor is supplied mainly by Bolivian Indians, from the neighboring repub-
, who work intermittently, putting in about half time, and are dull, drunken
l lazy, but, bad as it is, the labor supply is short, though the completion of
railway should give improvement. The manager desires to import Chinese,
ich would seem a sensible plan. Mine has 9x18″ and 6x20″ crushers, re-
cing ore to 2″ to 3″ size before shipment. Ore formerly was hand-picked
an average tenor of about 45% copper, for shipment, and ore shipped to end
1906 was 770,185 kilograms, giving average returns of nearly 40% copper
d 17.5 oz. silver per long ton. Production, 1906, is estimated at 500,000
. fine copper.

This is a property of exceptional promise, and has been well handled by
. Hawxhurst, under exceedingly trying circumstances. With sufficient out-
, apparently the Poderosa mine alone could be put in condition, in one to two
ars, to produce 100 to 150 tons daily, of ore of 15 to 20% average copper
nor, giving, on the mean of these figures, an average production of fully
00,000 lbs. fine copper monthly.

OLAND-AMERICAN GOLD MINING & MILLING CO. ARIZONA.

Mine office: Humboldt, Yavapai Co., Ariz. Organized, circa 1904, as a
rger of the American Gold & Copper Co. and the Poland Extension Gold
ining & Milling Co., with capitalization $2,500,000, shares $1 par. Was pro-
ted by Chas. J. George and is not regarded favorably. Idle.

OLAND EXTENSION GOLD MINING & MILLING CO. ARIZONA.

Dead. Merged, 1904, in Poland-American Gold Mining & Milling Co. For
rly at Poland, Yavapai Co., Ariz.

OLARIS MINING & MILLING CO. ARIZONA.

Office and mine: Clifton, Graham Co., Ariz. Samuel Abraham, president;
M. Williams, vice-president; D. P. W. Eylar, secretary; E. J. Lehmann,
easurer; L. F. Sweeting, general manager; preceding officers, Geo. Crispin,
icholas Cole, W. A. Hamilton and Ira Harper, directors. Organized March
, 1902, under laws of Arizona, with capitalization $2,500,000, shares $1 par.
bond issue, formerly authorized, has been recalled and canceled. Annual
eeting, third Wednesday in January.

Lands, 40 claims, area 700 acres, also a 70-acre millsite and 400 acres mis-
llaneous lands, in the Greenlee district, on the San Francisco river, circa 5
iles from Clifton. Property, lying northeast of the Clifton Consolidated and
ew England mines, shows granite, with parallel porphyry dykes, and many
honolite and rhyolite dykes, at acute and right angles to the vein system, ore
odies occurring mainly as contact deposits between limestone and igneous
ocks, with disseminated ores in porphyry. Lands show 4 ore bodies, of which
, under development, are of 8′ to 100′ estimated average width, traceable
irca 6,000′, carrying oxide, carbonate and sulphide ores, estimated to average
% copper, 4 to 15 oz. silver and $4 to $15 gold per ton. The copper ores are
ssociated with gold-bearing quartz with argillaceous gangue. The lower work-

ings show mainly auriferous and argentiferous chalcopyrite. Develop
by the 105′ Black Prince shaft, the 100′ Nonesuch shaft, the 140′ Golde
shaft, the 560′ Black Prince tunnel, the 320′ Fraction tunnel, the 307′
Eagle tunnel and the 532′ Phonolite tunnel, with circa 2,500′ of workin
mated to show 10,000 tons of ore in sight, with 4,000 tons blocked
stoping.

Improvements include 6 mine buildings. The nearest railroad is the
& New Mexico, 7 miles distant. Property is being operated, under le
piring 1912, by the Southwestern Development & Improvement Co.,
plans the erection of a concentrator, and, eventually, a smelter.

POLLYTON GOLD MINING CO. WY

Office: Centennial, Wyo. Mine office: Holmes, Albany Co., Wyo.
Emmons, president; R. F. Lawson, vice-president; E. B. Steadman, se
M. D. Reed, treasurer; preceding officers and G. C. Mason, director
Benton, superintendent. Organized March, 1908, under laws of Wyomi
capitalization presumably $3,000,000, shares $3 par. Lands, well wate
timbered, near the Maudem mine of the Topeka Copper Co., in the La
district, are supposed to carry the extension of the Maudem vein.
has a vein of 4′ to 8′ width, carrying a 12″ paystreak showing ore
20 to 50% copper and $2 to $40 gold per ton, with considerable fr
opened by a shallow shaft.

PONDERAY SMELTER.

Owned by Idaho Smelting & Refining Co.

PONDEROSA COPPER CO. CALI

Office: Delta Bldg., Los Angeles, Cal. Mine office: Bagdad,
nardino Co., Cal. J. H. Canovan, president; J. W. Green, superi
Lands are circa 14 miles from Bagdad.

PONDILLAI & VOLCAN MINES. NEW CALE

Letter returned unclaimed from former mine office, Diahot, N
donia. Properties are said to have rich ores, but are only slightly d
and have been idle some years.

PONTIAC COPPER MINES, LTD. BRITISH COL

Dead. Changed title, 1906, to Keremos-Pontiac Mines, Ltd. For
Olalla, East Yale, B. C.

PONTIAC GOLD & COPPER MINING CO. NEW

Dead. Formerly at Tres Piedras, Taos Co., N. M.

PONTIAC MINING CO. VIRGINIA & NORTH CA

Office: 19 Liberty St., New York, N. Y. Mine office: Virgilina,
Co., Va. A. A. Sumner, president; Samuel Bryant, secretary; Robt. G.
general manager. Organized 1902, under laws of New York, with capit
$1,600,000, shares $10 par.

Lands, 1,340 acres, in the Virgilina district of Virginia and North
carrying a fissure vein in schist, opened by the Tuck shaft of 125′
Glasscock shaft of 203′, showing cuprite, malachite and azurite to dep
below which are chalcocite, bornite and chalcopyrite, with quartz and
gangue, giving average assays of 4% copper and 1 to 2 oz. silver per
traces of gold. Has gasoline power. Idle several years.

PONTOTOC MINING CO. A

Office: care of T. H. Bass, secretary and treasurer, Beaumo
Mine office: Tucson, Pima Co., Ariz. J. M. Eastham, president; S. Y
son, general manager. Lands, 15 claims and 4 millsites, 7 miles north of
having a 75′ shaft, showing ore giving assays of 10.3% copper, with an
tenor of circa 5%.

POONA COPPER CO. SOUTH AUST

Office: Adelaide, South Australia. Mine office: Moonta, Daly Co

ia. Organized 1907. Lands, 240 acres, including the Poona and Matta nines, adjacent to the Moonta mine, having shafts of 120′ and 228′, considerable ore of good average tenor.

PINE MOUNTAIN COPPER CO. **MICHIGAN.**

ce: Cleveland, Ohio. Mine office: Ontonagon, Ontonagon Co., Mich. Watterson, president; E. S. Hough, secretary and treasurer. Was said been organized, 1901, under laws of New Jersey, with capitalization 0, but returns from Mr. Watterson give the ownership as vested in a e, promoted 1890, with 7 shareholders, title being held by trustees.

ds, 1,100 acres, well timbered, including a portion of the old Carp Lake the Porcupine Mountains, showing a continuation of the Keweenawan belt, with amygdaloidal traps, intercalated conglomerate tuffs, and e, having sundry beds carrying native copper, disseminated as speiss, sandstone. Property has 2 ore bodies, of 27′ estimated average width, terly and westerly strike and dip of 30° to the north, carrying esti- verage values of 3% copper, which is too high. Mine has circa 1,700′ ground workings, estimated to show 150,000 to 200,000 tons of stamp- lle several years.

GE LAKE & BISBEE MINING CO. **ARIZONA.**

ce: 12 First National Bank Bldg., Hancock, Mich. Letter returned d from former mine office, Bisbee, Cochise Co., Ariz. W. S. Cleaves, t; John Funkey, vice-president; W. I. McMaster, secretary; Chas. reasurer. Organized April, 1903, under laws of Arizona, with capital- $1,000,000, shares $1 par, succeeding the Portage Lake & Calumet De- nt Co.

ds, 12 claims, 3 fractional, area 191 acres, owned in fee and partly , 3 miles southeast of Bisbee, showing country rock of limestone, with ry contact. Has a 302′ shaft, with 2 compartments, well timbered. nall air-compressor, Worthington sinking pump, 75-h. p. hoist, boarding- unkhouse and smithy. Extensive diamond drilling was done, 1903-1904, iderable leached ore cut, the showing, while not including workable ore eing of an encouraging nature. Idle since 1904.

GE LAKE & CALUMET DEVELOPMENT CO. **ARIZONA.**

d. Reorganized, April, 1903, as Portage Lake & Bisbee Mining Co. at Bisbee, Cochise Co., Ariz.

ND COPPER CO. **WASHINGTON.**

e office: Berlin, King Co., Wash. Lands are sundry claims 5 miles from howing a 17′ vein, with east and west strike, carrying native copper, and chalcopyrite, opened by tunnels of 40′ and 75′. Idle.

ND COPPER MINING CO. **WYOMING.**

ce: 20 Broad St., New York, N. Y. Mine office: Rambler, Carbon o. P. S. Delaney, vice-president; Hon. J. C. Helm, secretary and treas- . C. Ledbetter, general manager; preceding officers, W. H. D'Esterre, T. C. Delaney, directors. Organized under laws of West Virginia, and proclaimed forfeited, 1902; reorganized 1908, under laws of Colorado, pitalization $1,500,000, shares $1 par.

ds, 5 claims, 3 patented, area 95 acres, known as the Portland mine, Battle Lake district, on the line of the Penn-Wyoming aërial tram. shows 12 veins, 6″ to 40′ wide, in a mineralized zone of circa 600′ hat averages about 1% copper. Has a sulphide copper vein of 30′ to h, estimated to carry average values of 11% copper and $4 to $40 gold which is much too high, the vein actually having a paystreak of 8′ to h, carrying about 5% copper and $2 to $4.80 gold per ton. Has 13 pits fts, deepest 243′, and a 650′ tunnel, latter said to show 35′ of 3% ore. am power, and has been developing steadily for several years, being

one of the few properties in Carbon county to do so. Planned beginning duction, 1908, by shipments to the Penn-Wyoming smelter, but apparentl not do so.

PORTLAND GOLD & COPPER MINING CO. WASHING

Office: 7-127½ First St., Portland, Ore. Mine office: Spirit Lake, mania Co., Wash. Harvey Bailey, president and general manager; C Wyss, vice-president; H. W. Bailey, secretary and treasurer; A. B. Burg general superintendent; preceding officers and Dr. R. D. Wiswall, dire Organized under laws of Washington, with capitalization $1,250,000, shar par. Lands, 17 claims, area 340 acres, well timbered, on the north fork o Toutle river, having circa 500′ of workings, showing ore giving good values in gold and copper. Idle.

PORTLAND-IMNAHA COPPER MINING CO. ORE

Dead. Disincorporated, September, 1902, with all debts paid. For at Imnaha, Wallowa Co., Ore.

PORTLAND LUNING COPPER CO. NEV.

Letter returned unclaimed from former mine office, Luning, Esmeralda Nev. Property is slightly developed by shaft and tunnel. Idle and appar moribund.

PORTLAND MINING CO. BRITISH COLUM

Office: 19 North Seventh St., Terre Haute, Ind. Mine office: Grove, Yale district, B. C. Andrew J. Crawford, president; M. T. Hidden retary; J. E. Bates, general manager. Organized 1901, under laws of B Columbia, with capitalization $15,000, shares 1 cent par.

Lands, 4 patented claims, area 200 acres, also 160 acres miscellaneous in the Aspen Grove district, showing 10 veins, of which 2, under develop give assays of 15% copper, 3 oz. silver and 80 cents gold per ton, fro bonate and sulphide ores, opened by a 155′ shaft and a 32′ tunnel, s show a considerable body of low grade ore. Idle several years.

PORTLAND (ROSSLAND) MINE, LTD. BRITISH COLU

Dead. Merged, 1904, in Velvet-Portland Mine, Ltd. Formerly at Ros Trail district, B. C.

PORT LINCOLN COPPER CO., LTD. AUSTR

Offices: 20 Copthall Ave., London, E. C., Eng., and 95 King Willia Adelaide, South Australia. Mine office: Reedy Creek, Robe Co., South tralia. Col. A. G. Pawle, chairman; G. F. B. Hancock, mine manager; R Orr, secretary. Organized July 13, 1906, under laws of Great Britain capitalization £350,000, shares £1 par.

Lands, 400 acres, freehold, on Tumby Bay, north of Port Lincoln, 35 northeast of Adelaide, and across Spencer Bay from Wallaroo. Pr known as the Kitticoola, Tungkillo or Reedy Creek mine, opened 1845, second oldest copper mine in South Australia, having 2 ore bodies, kno the north and south lodes, ranging up to 11′ width, and giving average of about 18% copper and 4 dwts. 6 grains gold per ton, from melaconite, and chalcopyrite. Main shaft, 115′. Has steam power.

SOCIEDAD MINERA PORVENIR DE COLLAHUASI. C

Office: Valparaiso, Chile. Mine office: Collahuasi, Tarapacá, Chil ganized Apr. 10, 1904, under laws of Chile, with capitalization 550,000 shares 100 pesos par.

PORVENIR DE SONORA CO. ME

Dead. Reorganized, 1902, as Coast Line Copper Co. Formerly Calera, Altar, Sonora, Mex.

SINDICATO MINERO DE POSCO.

Office: Iquique, Chile. Mine office: Posco, Camaná, Perú. Org *Dec. 9, 1905*, under laws of Chile, with capitalization £10,000, shares £1 p

AL GOLD, PLATINUM & COPPER MINING CO. **WYOMING.**
)ead. Formerly at Rambler, Carbon Co., Wyo. Fully described Vol. V.

'AL SAVINGS MINING & MILLING CO. **WYOMING.**
)ffice and mine: Centennial, Albany Co., Wyo. Capitalization $1,000,000, s $1 par. Richard F. Lawson, manager. Lands, 90 acres, in the Medicine range, including the old Centennial mine, which produced some gold.

)SI MINING CO., LTD. **IDAHO.**
Mine office: Silver City, Owyhee Co., Idaho. J. E. Masters, superintend- Has auriferous and argentiferous lead and copper ores, with electric r.

PAÑIA MINERA POTOSINA. **MEXICO.**
)ead. Formerly at Charcas, Moctezuma, San Luis Potosí, Mex.

PAÑIA MINERA POTRERILLOS. **CHILE.**
)ffice: Santiago de Chile. Mine office: Chañaral, Atacama, Chile. Or- ed Dec. 6, 1906, under laws of Chile, with capitalization 650,000 pesos, s 50 pesos par.

ERS GULCH DEVELOPMENT CO. **ARIZONA.**
Mine office: Globe, Gila Co., Ariz. Lands, on Pinto Creek, show a 6′ vein condary copper sulphides, with a paystreak giving average assays of about copper.

OCIACION MINERA DE POZOS. **MEXICO.**
Mine office: Pozos, Ciudad Porfirio Díaz, Guanajuato, Mex. Property in- s Santa Brigida y Anexas, Santa Lucia and La Argentina mines, produc- old, silver and copper, latter as a by-product. Has steam power.

)S MINING CO. **MEXICO.**
Mine office: Ahualulco, Jalisco, Mex. Kratz & Carroll, managers. Prop- has auriferous and argentiferous copper ores.

SSENOS COPPER CO. **ARIZONA, CALIFORNIA & MEXICO.**
Mine office: Casa Grande, Pima Co., Ariz. S. C. Palmer, president; C. E. , secretary; W. H. Birchfield, treasurer; B. S. Wilson, general manager; S. Wilson, mine superintendent. Organized under laws of South Dakota, capitalization $5,000,000, shares $1 par. Lands include a group of claims 30 miles south of Casa Grande, held under bond and lease, said to have ed $75,000 worth of silver-lead ore, under former management. Also holds ameron group, circa 11 miles southwest of Casa Grande, and has claims les south of Arizpe, Sonora, Mexico. Controls, through stock ownership, margosa Copper Co., which has lands in Inyo and San Bernardino counties,)rnia.

FT MINE. **GEORGIA.**
Mine office: Dahlonega, Lumpkin Co., Ga. Ores are cupriferous and erous pyrite, carrying up to 2% copper and $2 gold per ton. Presumably

MIER COPPER & ASBESTOS CO. **CAPE COLONY.**
Mine office: Prieska, Cape Colony. A. M. Reid, consulting engineer. Cap- ation £20,000; issued, £18,000. Lands, 14,000 morgen, or nearly 30,000 , known as the Schreuder group, apparently carrying mainly asbestos, g a continuation of the seam developed by the Cape Asbestos Co., Ltd.

MIER MINING, MILLING & LEASING CO. **NEW MEXICO.**
)ffice: care of J. H. K. Martin, secretary, Denver, Colo. Letter returned imed from former mine office, Pinos Altos, Grant Co., N. M. Alfred Mar- uperintendent. Property is the Copper Hill mine.

MIDENT COPPER & GOLD MINING CO. **MONTANA.**
)ffice: Butte, Mont. Mine office: Boulder, Jefferson Co., Mont. Dr. nand Grattan, president; *C. S. Shoemaker*, vice-president; Joseph Chauvin,

secretary; Walter Tallant, treasurer; Geo. Reeves, manager; preceding of Wm. Creedon and H. P. Bennett, directors. Organized circa August, under laws of Montana, with capitalization $1,200,000, shares $1 par.

Lands, 11 claims, 6 held outright and 5 under option, in the Big Foo trict, 14 miles southeast of Butte and 11 miles southwest of Boulder, s carry 1½ miles of a vein of 30′ to 60′ width. Development is by 80′ an shafts, 3,000′ apart. The 80′ shaft has ore giving average assays of abo copper, and the 210′ Roosevelt shaft is said to give ore assaying 2.5 to copper, 11 to 40 oz. silver and $2 to $10 gold per ton.

PRESIDENTIAL MINING CO. ARIZ

Mine office: Patagonia, Santa Cruz Co., Ariz. Lands, 6 claims, ci miles west of Patagonia, having 700′ of workings, showing argentiferous and copper ores. Employed 12 men, at last accounts.

PRESTON PEAK COPPER CO. CALIFOR

Dead. West Virginia charter forfeited 1902; lands sold, 1907, by s to Chas. F. Hickey, for $34,750.13. Formerly at Yreka, Siskiyou Co., Described Vol. V.

PRETORIA COPPER & TIN FIELDS, LTD. TRANSV

Office: P. O. Box 1223, Johannesburg, Transvaal. D. Symons, chair J. H. Munnik, manager; G. W. Morrison, secretary. Organized June 20, under laws of Transvaal, with capitalization £115,000, shares £1 par; i £103,333. Lands are the freehold farms Badfontein No. 600, Tweefontei 275 and Welgedacht No. 41, total area 10,683 acres. in the Pretoria dis also an option on the farm Elandsfontein No. 1782, area 10,882 acres, i Waterburg district, Transvaal. Operations are confined to prospecting, small scale.

PRICE COPPER MINE. COLOR

Office: 1313 Fillmore St., Topeka, Kans. Mine office: McCoy, Eagle Colo. Dr. J. C. McClintock, president; Chas. J. Price, vice-president; W Price, general manager; O. D. Mansfield, secretary and treasurer.

PRICKETT LAND CO. MICHI

Office: Marquette, Mich. Walter S. Prickett, chairman; J. E. Ball, s tary; Fred H. Begole, treasurer. Organized Sept. 18, 1905, under law Michigan, with capitalization $10,000, shares $10 par, fully issued. Has dividends, to Dec. 31, 1907, of $150,300. Lands are 3,694 acres of copper l in Keweenaw county, Michigan, including many old copper properties, acres of copper land in Ontonagon county, Michigan, and 520 acres of lands in Iron county, Michigan. Company sold circa 4,000 acres in Kewe county to the Keweenaw Copper Co., and has a large acreage of located mineral land on the Keweenawan trap range, carrying conside timber, with available millsites on both sides of Keweenaw Point, incl a good water frontage at the western end of Copper Harbor.

PRIDE MINING CO. COLOR

Dead. Formerly at Montezuma, Summit Co., Colo.

PRIDE OF ARIZONA COPPER CO. ARIZ

Dead. Was a swindle, promoted by Douglas, Lacey & Co. See Am mated Gold & Copper Co. Formerly in Yavapai county, Arizona.

PRIDE OF THE WEST MINING & MILLING CO. ARIZ

Office: 1801 Fifteenth St., Denver, Colo. Letter returned unclaimed former mine office, Washington, Santa Cruz Co., Ariz. Arthur R. Wilfley, P dent; Herbert E. Fiske, secretary. Organized May 1, 1901, under laws of rado, with capitalization $1,500,000, shares $10 par. Paid one dividend $15,000. Lands, circa 350 acres. Mine was opened 1870, reopened 1897, cl 1902, reopened circa 1906 and presumably closed 1907. Main shaft, about

re complex argentiferous copper, lead and zinc sulphides. Has a 200-ton
ntrator. Very fully described Vol. II.

SKA COPPER, LTD. **CAPE COLONY.**

ffice: Johannesburg, Transvaal. Mine office: Prieska, Cape Colony.
, 53,000 morgen, or upwards of 100,000 acres, including three farms,
n as the Prieska's Poort, Kalkgat and Dikklipspruit.

ST LAKE MINING CO. **IDAHO.**

ffice: Detroit, Mich. Mine office: Priest River, Bonner Co., Idaho.
LePage, secretary; C. George, treasurer. Development is by tunnel,
ed to cut the extension of the vein of the Idaho Continental, said to show
ssaying up to 16% copper.

A PRIMAVERA. **BRAZIL.**

Mine office: Cacapava, Rio Grande do Sul, Brazil. Lands, near the Santa
ara river, are in a mountainous district, showing Cambrian stratified beds
granite, having a nearly vertical vein variously reported as lying between
te and mica-schist and as between conglomerate and sandstone. Ores are
onates, silicates and chalcocite, mainly the latter, occurring disseminated
in small nodules, with average tenor of about 7% copper, with traces of
r, opened by a 100′ main shaft.

NCE ALFRED MINE. **AUSTRALIA.**

Mine office: Belton, South Australia. Produced, in first half of 1905, fine
er to amount of 78,400 lbs. Presumably idle.

NCE LYELL MINING CO., N. L. **TASMANIA.**

Office: 90 Queen St., Melbourne, Australia. Mine office: Gormanston,
tagu Co., Tasmania. G. A. Lawson, manager. Capitalization £100,000,
s £1 par. Lands, 25 acres, leasehold. Idle and apparently moribund.

NCE MINING & DEVELOPMENT CO., LTD. **BRITISH COLUMBIA.**

Office and mine: Revelstoke, West Kootenay district, B. C. J. T. Laing,
ident; J. A. Stone, vice-president; J. M. Scott, secretary, treasurer and
ager; C. J. Rumens, superintendent; preceding officers, Dr. C. Smyth, J. M.
racken and A. M. Smith, directors. Organized 1900, under laws of British
mbia, with capitalization $1,000,000, shares $1 par. Annual meeting, second
nesday in March.

Lands, 20 claims, area 800 acres, known as the Standard group, also a
ere millsite and 640 acres timber lands, giving total holdings of 1,920
, in the Standard basin, Big Bend district, circa 33 miles north of Revel-
. Country rocks are banded schist and diorite, carrying chalcopyrite and
ite, in a vein of 20′ width, with gangue of serpentine and argillaceous
, ore being estimated to carry average values of 6% copper, 2 oz. silver
$2 gold per ton. Development is by tunnels of 40′, 110′, 480′, 600′, 272′
720′, with circa 3,000′ of underground workings, estimated to show 150,000
of ore, with 100,000 tons blocked out for stoping. A good water power
ailable for mining and milling purposes. A tram-line and mill are needed.
erty considered promising.

NCESS ROYAL GOLD & COPPER MINING CO. **BRITISH COLUMBIA.**

Dead. Formerly on Princess Royal Island, B. C. Described Vol. VII.

NCETON COPPER MINING & SMELTING CO. **ARIZONA.**

Office: 171 Broadway, New York, N. Y. Mine office: Ft. Huachuca, Co
Co., Ariz. Henry Hamburg, president and general manager; Henry C.
ns, vice-president and treasurer; Herbert M. Kenner, secretary; preceding
rs, J. M. McConnell and L. de Vere Hamburg, directors; C. S. Wright,
tintendent. Organized 1901, under laws of South Dakota, with capitaliza
$2,500,000, shares $1 par.

Lands, 8 claims, well timbered, in Romney Cañon, Huachuca District, Hua
Mountains, opened by 4 shafts, deepest 70′, and by tunnels of 60′, 70′,

115′ and 250′, with a quarter-mile of underground workings, showing mal chalcocite and bornite, giving assays of 10% and up in copper, 10 to silver, and small gold values. Mine, discovered 1880, was worked 190 and work was resumed, circa 1907, after 2 years' idleness, caused by fi entanglements.

PRINCE WILLIAM COPPER CO. ALA

Office: 35 Wall St., New York, N. Y. Mine office: Valdez, Alaska. C. Nichols, president. Organized 1907, under laws of New Jersey, wit italization $500,000. Lands, 12 claims, area 240 acres, at tidewater, on K Island, having a vein claimed in press to be 260′ wide and to carr copper, which is a self-evident exaggeration. Vein is reported otherw be 40′ wide, carrying 5 to 9% copper, which is considered an overesti First smelter shipment, July, 1907, gave returns of 6.82% copper.

PRINCE WILLIAM SOUND AMALGAMATED COPPER CO. ALA

Letter returned unclaimed from former office, 1115 Stock Exchange cago, Ills. Mine office: Ellamar, Prince of Wales Island, Alaska. Wa to have been organized, circa 1907, by H. Curtis Elliott and associates, f purpose of operating the Ellamar and other properties in the Prince W Sound district. Idle and presumably moribund.

PRINCE WILLIAM SOUND MINING CO. ALA

Mine office: Valdez, Alaska. Lands, on Mummy Bay, Knights I have a 300′ tunnel, driving to intersect a shear-zone of about 40′ width, ing bands and scattered grains of chalcopyrite assaying up to 11.5% c and 1 oz. silver per ton.

PRODUCER MINING & SMELTING CO. ARIZ

Dead. Lands reverted to Frank Brownell, former owner. Formerly at Grande, Pinal Co., Ariz. Fully described Vol. VI.

PRODUCER GOLD & COPPER MINING & MILLING CO. WYOM

Mine office: Encampment, Carbon Co., Wyo. Capitalization $3,00 shares $1 par. Lands, 12 claims, on Copper Mountain, slightly developed. an air-compressor and a mill with 10 gravity stamps. Presumably idle.

COMPAÑIA MINERA PROMONTORIO. ME

Office and mine: Apartado 60, Durango, Durango, Mex. Maximiliano I general manager. Property is the Dulces Nombres mine, carrying large bo auriferous and slightly argentiferous copper ore. Has gas power and a mill, also a small matting furnace, employing circa 75 men, at last acco

PROMONTORIO CONSOLIDATED MINING CO. ME

Office and mine: Nogales, Magdalena, Sonora, Mex. Leopold Ep president; R. D. George, secretary. Lands, circa 30 miles south of N carry auriferous and argentiferous lead and copper sulphides. Was for about 12 years, by Mr. Ephraim, before formation of present co high grade ores being shipped to El Paso smelters and low grade ores a lated on dumps. Later developments have not come up to expectation concentrator planned was not built. Presumably idle.

PROMONTORIO MINING & SMELTING CO. ME

Dead. Formerly at Lampasos, Moctezuma, Sonora, Mex.

PRO PATRIA MINING & MILLING CO. COLO

Mine office: Rico, Dolores Co., Colo. W. J. Scoutt, superintende last accounts. Ores carry gold, silver, lead and copper. Has water and power and a 50-ton concentrator. Presumably idle.

PROSPER COPPER SYNDICATE. AUSTR

Mine office: Essington, N. S. W., Australia. Organized 1907, under of New South Wales, with capitalization £1,200, shares £12 par. Lands the Rockley district. Presumably idle.

SPER GOLD MINING CO. **NEW MEXICO.**
Mine office: Hillsboro, Sierra Co., N. M. Ores carry gold, silver and cop- Has steam power. Idle.

VIDENCE GOLD & COPPER CO. **CALIFORNIA.**
Office: 617 Homer Laughlin Bldg., Los Angeles, Cal. Mine office: Kelso, Bernardino Co., Cal. P. H. Mathews, president; W. E. Baxter, vice-presi- ; F. H. Messmore, auditor; preceding officers, C. M. Wood and Jas. H. ey, directors; C. J. Callahan, consulting engineer. Organized Nov, 2, 1901, r laws of Arizona, with capitalization $3,000,000, shares $1 par. Annual ting, first Monday in November.
Lands, 15 claims and 8 millsites, area 340 acres, patents applied for, in unorganized Arrow district, showing 15 fissure veins, carrying sulphide , assaying circa 1% copper and $4 to $1,000 gold per ton, with small silver es. Has several shafts, all under 100′, and an 800′ tunnel, with a total of t one-half mile of workings.

OVIDENCE MINING CO., LTD. **BRITISH COLUMBIA.**
Office: 525-204 Dearborn St., Chicago, Ills. Mine office: Greenwood, ndary district, B. C. Mark F. Madden, president; Dr. Frank Byrnes, vice- ident; M. S. Madden, secretary; John B. Heney, treasurer; P. J. Dermody, rintendent. Capitalization increased, January, 1907, from $200,000 to 00,000. Bonds, $50,000 authorized, at 6%. Paid dividends of $38,000, to of 1906.
Mine has a 600′ shaft, planned to be sunk to 1,000′, showing argentiferous auriferous copper sulphides, with principal values in gold, and has consid- le ore blocked out. Has a 10-drill air-compressor. Production, 1907, given 0 tons of ore, and, to end of 1907, had produced ore worth $400,000. Ap- tly paid in dividends money that should have been retained for develop-

VIDENCIA GOLD, SILVER & COPPER MINING CO. **ARIZONA.**
Dead. Formerly at Tucson, Pima Co., Ariz. Described Vol. VI.

VIDENCIA MINES CO. **MEXICO.**
Mine office: Cosalá, Sinaloa, Mex. E. A. Stent, manager, at last accounts. nized circa 1906, with capitalization $500,000, to operate the Campanillas . Presumably idle.

VINCIAL SMELTING & REFINING CO. **ONTARIO.**
Works office: Parry Sound, Ont. Early 1908 planned building a smelter.

DENTIAL COPPER MINING CO. **ARIZONA.**
Office: care of Shea Smith, president, 18 Custom House Pl., Chicago, Ills. r returned unclaimed from former mine office, Prescott, Yavapai Co., Idle and apparently moribund.

DENTIAL MINING CO. **CALIFORNIA.**
Office: care of H. S. Reed, manager, Medford, Ore. Mine office: Crescent Del Norte Co., Cal. Lands, near Shelly Creek, are slightly developed by and tunnel, showing 2 veins of 25′ to 30′ width, carrying slightly aurif- and argentiferous chalcopyrite, sphalerite and pyrrhotite. Idle several and apparently moribund.

DENTIAL MINING & DEVELOPMENT CO. **ARIZONA.**
Dead. Formerly at Nogales, Santa Cruz Co., Ariz.

IÉTÉ ANONYME FRANÇAISE DES MINES DE CUIVRE DE PRUNELLI (CORSE). **CORSICA.**
Office: 51 Rue Vivienne, Paris, France. Mine office: Marignana, Ajaccio, ica. Organized Dec. 29, 1906, under laws of France, with capitalization 0,000 francs, shares 100 francs par. Lands include the Argentella group, ying argentiferous *copper ores, associated* with sulphides.

PSYCHE MINING CO. OR

Dead. Formerly at Greenhorn, Baker Co., Ore. Described Vol. VII

PTARMIGAN MINES OF THE SELKIRKS. BRITISH COLU

Mine office: Wilmer, Northeast Kootenay, B. C. Thos. Starbird ager. Lands, at the head of McDonald Creek, an affluent of Horse Creek, show highly auriferous and argentiferous copper ores, with about of workings. Has steam and water power. Idle at last accounts, awaiting pletion of a projected railroad.

PUEBLO COPPER MINING & MILLING CO.

Letter returned unclaimed from former office and mine, Johnson, Ka Utah. T. G. McCarthy, president; John T. West, vice-president; R. Le ham, secretary; J. H. Means, treasurer. Organized circa December, 1907, laws of Utah, with capitalization $250,000, shares 25 cents par. La claims, in the Rock Spring district.

PUEBLO MINE. YU

Owned by Yukon Pueblo Mines.

PUERTECITO COPPER CO. ME

Mine office: La Cananea, Arizpe, Sonora, Mex. Succeeded the Copper Co. Assets consists of a lawsuit against Col. Wm. C. Greene.

PUGET SOUND COPPER MINES. BRITISH COLU

Mine office: Van Anda, Texada Island, B. C. Has a copper ore body heavy gossan capping of fair grade iron ore. Idle several years.

PUGET SOUND INVESTMENT CO. BRITISH COLU

Dead. Formerly at Van Anda, Texada Island, B. C.

PUGET SOUND IRON CO. BRITISH COLU

Mine office: Van Anda, Texada Island, B. C. W. H. Lee, superinte Has iron ore, also auriferous and argentiferous copper ore.

PUGET SOUND REDUCTION CO. WASHING

Works office: Everett, Snohomish Co., Wash. Is controlled, through ownership, by American Smelters Securities Co. Has three 30x180" furnaces, one running on copper ores, making a 50% matte, which is up to blister copper in a reverberatory furnace, and shipped east for el lytic refining. Also has an arsenic plant, formerly making about 5 to arsenic daily, from Monte Christo ores.

PUGWASH CONSOLIDATED MINING & SMELTING CO. NOVA SC

Dead. Formerly at Pugwash, Cumberland Co., N. S. Described Vo

PUGWASH RIVER COPPER CO. NOVA SC

Dead. Succeeded, circa 1904, by Pugwash Consolidated Mining & ing Co., also dead. Formerly at Pugwash, Cumberland Co., N. S. Des Vol. IV.

PULIDO MINING CO., LTD. PORTU

Office: 20 Bucklesbury, London, E. C., Eng Mine office: Beja, Ale Portugal. John Silva, chairman; F. E. Webb, secretary. Organized Au 1895, under laws of Great Britain, with capitalization £165,000, shares £ issued, £154,500. Lands, 32 copper and gold mining concessions, area acres. Idle since circa 1901.

COMPAÑIA DE MINAS y FUNDICIONES DE PÚQUIOS. C

Dead. Was succeeded by Compañía Minera de Púquois. Former Púquios, Rancagua, Atacama, Chile.

COMPAÑIA MINERA DE PÚQUIOS. CH

Office: Casilla 178, Valparaiso, Chile. Mine office: Púquios, Rare Atacama, Chile. Employs 60 men. E. J. J. H. Sandiford, chairman; F. H. Clelland, vice-chairman; H. S. Sydney-Merritt, secretary and treasurer ceding officers, J. C. Kenrick and Walter Squire, directors; Archibald S general manager; R. Benbow, mine superintendent. Organized Nov. 1,

laws of Chile, with capitalization £100,000, shares £1 par, as successor mpañía de Minas y Fundiciones de Púquios, and reorganized Jan. 8, 1906, laws of Chile, with capitalization £80,000, shares £1 par. Annual meet- fourth Saturday in February.

Lands, 44 claims, area 144 hectares, showing country rock of diorite, with t and west ore bodies, known as the Jefe, Repalon and Estaca lodes, inter- d at nearly right angles by the Verde, Sofia and Farellon lodes. The line nection between the Jefe and Verde lodes gives dykes of 30′ width. The and Jefe lodes are under development, latter, of circa 4′ average width, eable 2,500 meters, showing oxidized ores, bornite and chalcopyrite, giving mated average assays of 12% copper and up to 24 oz. silver per long ton, traces of gold. Development is by the old Farellon shaft of 693′, the Estaca shaft of 595′, the new Sofia shaft of 429′, also by the 610′ Sofia south nel, 612′ Jefe east tunnel and 500′ Jefe west tunnel, with a total of 3,140′ new workings, showing 3,000 long tons of ore, with 1,100 tons blocked out stoping.

The mine dates from 1862, and has been in the hands of various owners, was closed by two floods in the Sofia mine, caused by storm waters, and reason of the ore becoming base in the transition zone. Property was held rmerly by the Compañía Farellon de Púquios.

Equipment includes 2 hoists, good for 900′ each, and 2 Rand & Walker compressors. There are several buildings and ranchos, including administra- n building, hotel, office, store and foreman's dwellings. Ores are sent to ldera for reduction, by the Ferrocaril de Copiapó, connected with the mine a Bleichert aerial tram of 2 kilometers length, completed May, 1908. Fuel Australian coal, costing 55s. per long ton.

Production, 1907, was 104,000 lbs. fine copper, secured from 295 tons of extracted from development work only, giving returns of 14.7% copper. pany plans sinking the main Sofia shaft into the sulphide zone, opening 3 levels and building a new headgear and ore-bins. Property considered mising and management good.

RITAN COPPER & GOLD MINING CO. **NEW MEXICO.**

Dead. Was a swindle, promoted by Benj. F. Coburn, of Boston, who "guar- eed" 10% dividends for 5 years. Formerly at Tres Piedras, Taos Co., M. Described Vol. II.

MPAÑIA DE MINAS I FUNDICIONES DE PUTAENDO. **CHILE.**

Office: Santiago de Chile. Mine office: Putaendo, Aconcagua, Chile. anized Jan. 17, 1907, under laws of Chile, with capitalization 720,000 pesos, res 36,000 pesos par.

NE SMELTING CO. **CALIFORNIA.**

Letter returned unclaimed from former office, 26 First National Bank lg., San Francisco, Cal. Works office: West Alameda, Alameda Co., Cal. W. Pyne, manager. Works have a daily capacity of 100 tons. Idle since 3, having been closed by courts, on complaints that fumes injured vegeta- n, with small prospects of resumption.

RAMID COPPER CO. **UTAH.**

Mine office: La Sal, Grand Co., Utah. Organized 1902, under laws of ine, with capitalization $500,000. Lands, in the Sinbad Valley, have a nket vein between sandstone strata, carrying ore of about 3% copper tenor. mpany claims enough ore in sight to run a mill for 2 years. Has a 50-ton ching plant, using sulphuric acid made at the works from sulphide ores, med to effect an extraction of 98% of assay values, which is not believed. ed down, late 1907

AMID COPPER SYNDICATE, LTD. **BRITISH COLUMBIA.**

Dead. Dissolved *Aug. 8, 1905.* Formerly at Golden, East Kootenay, B. C.

PYRAMID GOLD & COPPER MINING CO. ARI

Dead. Formerly at Prescott, Yavapai Co., Ariz. Described Vols. V

PYRAMID PEAK MINING CO. NEW M

Dead. Lands sold, December, 1905, by sheriff. Formerly at Lor Grant Co., N. M.

PYRENEES COPPER MINES, LTD. FR

Dead. Dissolved, August, 1904. Formerly in the Basses Pyrenees,

PYRENEES MINERALS, LTD. FR

Office: 14 Great Winchester St., London, E. C., Eng. E. Glasse, ing director; H. Gulliver, secretary. Organized May 5, 1902, under Great Britain, with capitalization £150,000, shares £1 par; issued, Debentures, £60,000, at 6%. Lands, 1,818 acres, including the Alzen sil copper mines, in the department of Ariège, France. Has a 20-ton smelt last accounts was in litigation with former owners of the property.

"Q" COPPER SYNDICATE, LTD. AUST

Office: Worcester House, Walbrook, London, E. C., Eng. Mine Mackay, Queensland, Australia. T. W. Gilbert, secretary; G. Lloy mine manager; Edmund Lloyd-Owen, consulting engineer. Organize 29, 1905, under laws of Great Britain, with capitalization £10,000, cumulative 6% preference shares of £1 par, and 50,000 ordinary share par. Lands, 160 acres, leasehold, known as the Pine Vale and Ben Moh Presumably idle.

Q. S. GOLD MINING & SMELTING CO. WASHI

Office: 408 Empire State Bldg., Spokane, Wash. Mine office: ully, Okanogan Co., Wash. Col. Adelbert M. Dewey, president and manager; M. L. Bevis, vice-president; Carl L. Shuff, secretary; E. J. treasurer; L. K. Armstrong, consulting engineer. Organized 1897, und of Washington, with capitalization $2,000,000, shares $1 par.

Lands, 18 claims, also 60 acres of millsites and water-rights on Sin Creek, in the Salmon district, circa 12 miles south of Loomis. Propert diorite, with 6 fissure veins, carrying mainly low grade copper values pany claims an ore body more than 300′ wide and more than 4,500′ lon seems a serious overestimate as regards width. Development, begun by 2 tunnels, second started circa 1907, at base of the mountain, to at about 2,000′ estimated depth. The tunnel, at distance of 900′, is cut 50′ of ore, without proving the walls, carrying chalcopyrite, estim 2 to 4% copper tenor, with small and variable silver values and circa per ton. Ore is said, in the press, to average about $14 per ton in gross

Equipment includes a 200-h. p. hydro-electric power plant, takin from Sinlahekin Creek. Improvements include a sawmill and sever mine buildings.

The management claims to show more ore than the Granby, whic true, and of about double the average tenor of Granby ore, which is co something more than doubtful. Notwithstanding these exaggeratio company is to be commended for its steady continuance of work, whic well planned, and the property is considered promising.

QUANTOCK MINING & MILLING CO. MON

Mine office: Coloma, Powell Co., Mont. H. B. Salisbury, superint Has gold, silver and copper ores, with steam power, employing 12 men accounts.

QUARTZ KING MINING CO. ARI

Mine office: Parker, Yuma Co., Ariz. Capitalization $1,500,000, $1 par. Lands, circa 2,000 acres, 4 miles north of Parker, having 4 sh about 100′ depth each, and several tunnels, longest 125′. Employed men at last accounts.

EBEC COPPER CO., LTD. **BRITISH COLUMBIA.**

Dead. Formerly at Deadwood, Boundary district, B. C.

NA LA QUEBRADA. **VENEZUELA.**

Mine office: Aroa, Lara, Venezuela. Includes the principal mines of the ebrada or Aroa district of Venezuela, which have produced about 60,000 s of fine copper. Lands, 67 miles west of Puerto Cabello, include the muragua mine, having a vein of carbonate ore 1' to 5' wide; the Titiara ne, with vein 2' to 25' wide; the San Antonio mine, with vein of 3' to 18', d the Quebrada mine, with a vein 50' to 75' wide, 2,000' long and of unown depth, from which oxide and carbonate ore have been mined in the eration zone, leaving a large body of sulphide ore, averaging possibly 4 6% copper, in the lower workings. Was operated extensively, 1881-1894, oducing 271,770 long tons copper ore, valued at about £1,250,000. Idle since 94, and likely to remain so until Venezuela enjoys more settled political nditions, and better treatment is accorded foreign owners of mining conssions.

UEEN BEE COPPER MINING CO.

Dead. Formerly had an office at 220 Broadway, New York, N. Y. Locaon of lands, if any, unknown.

UEEN BEE COPPER MINING CO., N. L. **AUSTRALIA.**

Mine office: Wrightsville, Robinson Co., N. S. W., Australia. T. E. rquhar, chairman; preceding officer, J. R. Ratcliff and G. D. Elliott, direcrs. Lands are in the Bee Mountains, about 11 miles southeast of Cobar. ine has a 500' main shaft, showing ore assaying up to 45% copper, with fair old and silver values, and, on the 4th level has a vein of circa 20' width, eraging about 7% copper. Has steam power and an air-compressor. Smelter as 4 reverberatory furnaces and a small water-jacket blast-furnace, and mpany plans installation of larger blast-furnace. Ore smelted, last half of 07, gave average extraction of 7.75% copper. Production, 1907, was 1,104,320 s. fine copper. Employs circa 200 men.

UEEN BEE MINING & MILLING CO. **WYOMING.**

Dead. Was succeeded, June, 1902, by Wyoming Queen Mining Co. Forerly at Jelm, Albany Co., Wyo.

UEEN COPPER MINING CO. **ARIZONA.**

Office: Globe, Ariz. Mine office: Superior, Pinal Co., Ariz. W. D. Fisk, resident; J. H. Thompson, vice-president; Joseph W. Bandhauer, secretary nd superintendent; Richard Fleming, treasurer. Organized 1906, under laws f Arizona, with capitalization $5,000,000, shares $1 par. Property is the old ilver Queen mine, near the Lake Superior & Arizona, opened circa 1880, and orked some years for silver. Mine, opened to depth of 300', has extensive d workings, showing, on the 300' level, an 18" paystreak of chalcocite and to 4' of malachite assaying up to 40% copper, chalcocite carrying up to 310 z. silver per ton. Has steam power. Property considered promising.

UEEN & CRESCENT COPPER CO. **IDAHO.**

Dead. Was merged, circa 1908, in Copper Queen Mining & Smelting Co., areholders receiving one share new stock for 8 shares of old. Formerly at pper Queen, Lemhi Co., Idaho.

UEEN GOLD & COPPER MINING & SMELTING CO. **OREGON.**

Office: 1345 Pierce St., San Francisco, Cal. Mine office: Wonder, Jophine Co., Ore. W. H. Ramsey, president; B. M. Cahill, vice-president; John wson, secretary; W. A. McElroy, treasurer. Organized under laws of Oren, with capitalization $1,000,000, shares $1 par.

UEEN LYELL MINING CO., N. L. **TASMANIA.**

Office: 90 Queen St., Melbourne, Australia. Mine office: Germanston, ntagu Co., Tasmania. G. A. Lawson, manager. Capitalization £100,000,

shares £1 par. Lands, sundry leasehold claims, in the Mount Lyell field. Idle and presumably moribund.

QUEEN MINING & MILLING CO. NEW MEXICO.

Office: Galveston, Tex. Mine office: Cooney, Socorro Co., N. M. H. A. Griffin, secretary. Organized under laws of Texas. Lands, 5 claims, known as the Copper Queen group, showing good bodies of low grade gold-silver-copper ores, developed by about 3,000′ of underground workings. Has steam power and a 15-stamp pan-amalgamation mill. Idle.

QUEEN OF ARIZONA COPPER CO. ARIZONA.

Dead. Merged, circa 1902, in Great Belcher of Arizona Co. Formerly at Providence, Yavapai Co., Ariz. Described Vol. III.

QUEEN PRINCESS COPPER CO. COLORADO.

Mine office: Copperfield, Frémont Co., Colo. John R. Stephen, president; Edward S. Halter, secretary; Edward Baugh, treasurer. Capitalization $3,000,000, shares $1 par. Lands, 14 claims, area 147 acres, in the Red Gulch district, 9 miles north of Cotopaxi. Property has a main ore body said to average 2.5% copper, and has secured assays of 40 to 60% in tenor, and company claims that trial shipments returned 17% copper. Main vein is claimed to be 300′ wide, which is doubtful. Development is by a 135′ shaft. Equipment includes steam power and a hoist.

QUEEN REGENT COPPER & GOLD CO. NEVADA.

Office: 368 Bush St., San Francisco, Cal. Letter returned unclaimed from former mine office, Fairview, Churchill Co., Nev. J. E. Kerr, manager. Organized 1907, under laws of Arizona, with capitalization $2,000,000. Lands, 14 claims, 14 miles south of Fairview, on the southern side of Copper Mountain, known as the Copper King group, claimed to have a hematite gossan of 50′ to 100′ width, and claimed to show, in a trench, native copper of 12% tenor, with gold and silver values aggregating $42 per ton, which seems an unusual, if not impossible, combination. Has a 100′ tunnel, cutting a 4′ vein and planned to cut 5 additional veins in length of about 500′.

QUEENSLAND COPPER CO., LTD. QUEENSLAND.

Office: 6 Princes St., London, E. C., Eng. Mine office: Mount Perry, Bowen Co., Queensland, Australia. Employs 337 men. Geo. Grinnell-Miles, chairman; J. G. Tait, secretary; S. T. Williams, mine manager; Sydney H. Fulbrook, superintendent; J. S. MacArthur, consulting engineer. Organized Feb. 1, 1898, under laws of Great Britain, with capitalization £500,000, shares £1 par, in £250,000 cumulative 6% preference shares and £250,000 ordinary shares. After payment of 6% on ordinary shares, in any year, remaining profits are divisible equally between preference and ordinary shares. Last dividend, 1903, on ordinary shares, was 6%. For fiscal years ending July 31, profits have been as follows: £12,756 2s. 11d. in 1905; £28,893, with dividends of £12,810, in 1906; £36,143, with dividends of £19,486, in 1907.

Lands include 1,650 acres bought of the Mount Perry Copper Co., also the Normanby mine, near Mount Perry, taken over June, 1905, under 2 years option, and bought, 1907, for £12,000. Miscellaneous holdings include the Reed's Creek, Great Freehold and New Moonta mines, and company also bought the lands of the Burnett (Queensland) Exploration Co., Ltd. The 3 principal mines of the company have 15 shafts, of 120′ to 800′ depth, and the company also works various mines in the Wolca and Boolboonda districts. The combined area of the Mount Perry and Reed's Creek mines is 650 acres, freehold.

The Mount Perry mine has fissure veins traversing granite, the main vein, of about 12′ average width, having a paystreak 6″ to 8″ wide in the upper levels and 10″ in the lower levels, carrying an average of circa 16% copper. The mine formerly was opened by 3 shafts, poorly located and inadequate,

ave been replaced by new shafts. The ground is growing harder with

e Kennedy shaft, 1,020′ deep, with bottom level at 1,000′, shows a vein of ore of fair copper tenor, opened by crosscut. About two-thirds production, 1906, was from the Kennedy shaft.

e Milne shaft, planned to cut the lode at circa 1,000′ depth, early 1909, een the Kennedy and Southern shafts, and is planned to replace the y as the main working shaft of the mine. The Milne shaft is vertical, ll obviate considerable crosscutting and long trams.

e Southern shaft probably will be abandoned, and the ground tributary developed from the new Milne shaft.

e Palmer shaft is a considerable producer, showing good ore, and has hoisting plant, installed 1906.

e Reed's Creek mine has a fissure vein in granite, similar to that of . Perry, and is extensively developed, but the shafts are small and located for modern mining requirements.

e Normanby mine, 240 acres, freehold, on the other side of the moun- om the Mount Perry, formerly held under option, is now owned outright. ormanby shows a vein paralleling the Mount Perry, with ore of a similar averaging circa 13% copper and 10 to 15 dwts. gold per ton. The haft, on the southern part of the property, 352′ deep, is in a vein of 12″ average width, carrying ore averaging circa 12% copper, 6 oz. silver dwts. gold per long ton. The Normanby mine was producing about 400 ore monthly, at end of 1907.

e Great Freehold mine, area 811 acres, has a nearly vertical fissure vein, uite, averaging 5′ width, with an 18″ paystreak carrying chalcopyrite ing circa 14% copper, with fair gold and silver values, developed by a ain shaft. Apparently this mine is idle.

addition to the mines of the Mt. Perry district, the company holds eenback, Potosi and Wolca mines, in the Wolca district, northeast of rry, and the New Moonta, Edena and Boolboonda mines, in the Bool- district, northeast of the Wolca district. The veins of these latter ies are narrow, but persistent, and carry high-grade auriferous and ferous copper ores.

e New Moonta mine, at Boolboonda, 12 miles northeast of Mount is a new mine having a 121′ shaft, from which circa 2,000 long tons of rade ore were extracted, 1905, and gives promise of holding good ore to depth.

e smelter, at Mount Perry, built 1902, has 40-ton and 90-ton water- blast-furnaces, and a reverberatory furnace, with a 120′ smokestack. nelter is connected with the principal mines by a tram-line, and does smelting.

oduction, for fiscal years, has been as follows: 10,388 long tons of out 25% of which was custom ore, yielding 2,952,32[illegible] lbs. fine copper, oz. silver and 2,655 oz. gold in 1[illegible]; 3,857,2[illegible] lbs. fine copper, 9,[illegible] and 2,201 oz. gold in 1[illegible]; 4,575,6[illegible] lbs. fine copper, 195,701 oz. silver 341 oz. gold, from 17,944 long [illegible] smelted in 1907, showing an e extraction of about 11.4% copper from all ores treated, including ores. Costs, 1907, were £[illegible] per long ton of copper, at the [illegible]e.

e company's properties have proven somewhat disappointing as a possibly because the lodes originally [illegible] et understanding of the circumstances, [illegible] ed vigorous development work during the era of high prices became

was not caught unprepared by the slump of 1907. Property considered va ble and management good.

QUEENSLAND COPPER FREEHOLDS, LTD. AUSTRALI

Office: 2 Broad St. Place, London, E. C., Eng. Mine office: Clonc Beaconsfield Co., Queensland, Australia. T. G. Scott, chairman; Alex Hill Stewart, consulting and managing engineers; C. D. Comrie, secretary. Org ized Jan. 31, 1907, under laws of Great Britain, with capitalization £300, shares £1 par; issued, £250,000. Owns a third interest in the Mountain Ho Copper Co., Ltd. Lands, 378 acres, freehold, circa 90 miles north of Clonc in 8 groups, including the Malbon and Argylla, former having a 25′ shaft sh ing cuprite, azurite, malachite and chalcocite. Presumably idle.

QUEENSLAND MINES EXPLORATION CO. AUSTRALI

Dead. Formerly at Mt. Perry, Bowen Co., Queensland, Australia.

QUEENSLAND SMELTING CO., LTD. AUSTRALI

Office: Dashwood House, London, E. C., Eng. Works office: Alder Cook Co., Queensland, Australia. Chas. Poston, chairman; Jas. Lewis, sec tary; T. Rowe and E. P. Landon, trustees for debenture holders. Organ Jan. 3, 1899, under laws of Great Britain, as reconstruction of a company same name organized 1888, with capitalization £50,000, in £30,000 cumulati 5% preference shares and £20,000 ordinary shares; issued, £38,630. Deb tures, £65,000 authorized, £43,800 issued, in £100 bonds, at 5%. Paid a 5 dividend, on preference shares, 1903. Last published accounts, 1904, sho profits of £3,105. Property is 1,168 acres, freehold, with a smelting p having furnaces for reduction of copper, gold, silver and lead ores.

QUEEN VICTORIA MINE. BRITISH COLUMBI

Letter returned unclaimed from former mine office, Nelson, Kootenay di trict, B. C. Lands, at Beasley Siding, 7 miles from Nelson, show a big bl of ore, claimed to be 300′ wide and 400′ long, with rhyolite walls, carryi copper ore of low average tenor, with small silver and gold values, and a li nickel. Mine, worked opencast, is estimated to have 200,000 tons of ore sight, said to assay 5 to 7% copper, but probably averaging 2 to 4% copp and 1 oz. silver per ton, with small gold values. Has a tramway and c connection, and made, 1907, considerable shipments to the Trail smelter. Is property of considerable promise, owing to immense size of ore body, thou low in copper tenor.

COMPAÑIA EXPLOTADORA DE LA MINA DE COBRE QUILILLA. MEXICO

Office: Scranton, Pa. Mine office: Ameca, Jalisco, Mex. Chas. S. We ton, president; John W. Fowler, secretary and treasurer; Independence Gro general manager; Felix Orozco, superintendent. Lands, 50 pertenencias, are 123 acres, showing 2 fissure veins in porphyry, of which one, of 4′ to 6′ averag width has 5 shafts, of 40′ to 190′, and 5 tunnels, longest 460′, with abo 1,500′ of workings. Ores give average assays of about 9% copper, 10 to 25 o silver and $3 gold per ton.

QUINCY & ARIZONA DEVELOPMENT CO. ARIZONA

Dead. Formerly at Bisbee, Cochise Co., Ariz. Described Vol. IV.

QUINCY MINING CO. MICHIGAN

Office: 1000-32 Broadway, New York, N. Y. Mine and works offic Hancock, Houghton Co., Mich. Employs circa 1,800 men. Wm. R. Tod president; Walter P. Bliss, vice-president; preceding officers, Cleveland H Dodge, Jas. L. Bishop, Chas. J. Devereaux, Isaac H. Meserve, Daniel T Brigham, Wm. M. Belcher and Otto Kirchner, directors; W. A. O. Paul, secre tary and treasurer; Chas. L. Lawton, superintendent; Jas. W. Shields, a superintendent; Alex Laist, smelter superintendent; Thos. Whittle, ch

ain; Chas. K. Hitchcock, engineer; M. J. McLain, clerk; E. R. tant clerk; H. M. Tompkins, smelter clerk.

ed March 30, 1848, under special charter from the state of Mich- capitalization $500,000, for a period of 30 years; renicorporated, 78, under laws of Michigan for a second period of 30 years, with n $1,000,000, shares $25 par, increased later to $1,250,000, and ased, Apr. 16, 1897, to $2,500,000; reincorporated, 1908, under laws n, for a third term of 30 years, with capitalization $3,750,000; 50,000. Old Colony Trust Co., Boston, transfer agent. Shares are e Boston stock exchange.

incy paid its first dividend in 1862, and profits have been disbursed lders in every succeeding year, except 1866 and 1867, giving the continuous dividend record of more than 40 years, from 1868, t the oldest dividend paying American copper mine, and, among mines of the world, the second oldest dividend payer, being pre- by the Tharsis Sulphur & Copper Co., Ltd., which has a record of dividends since 1867, or one year longer than the Quincy's record. idends, by years, have been as follows: $550,000 in 1903; $500,000 600,000 in 1905; $1,250,000 in 1906; $1,350,000 in 1907; $495,000 Dividends for 1908 were $1.50 for the first quarter, and $1 each for remaining quarters of the year. The new stock issue, of 10,000 s sold to stockholders, at $70 per share. The company has paid ends, to end of 1908, of $18,450,000.

llowing table shows statistics of production, costs, etc., 1864-1905:

	Product. Pounds.	Yield fine copper per fathom broken. Pounds.	Price obtained. Cents.	Cost per pound exclusive of construction. Cents.	Number of miners.	Average monthly contract wages.
.....	2,498,574	562	44.8	26.7	242	$65.50
.....	2,720,980	501	....	....	212	57.53
.....	2,114,220	451	31.3	29.0	227	53.16
.....	1,921,620	526	22.7	18.9	167	50.83
.....	1,417,941	447	25.2	23.1	157	50.44
.....	2,417,365	446	21.9	16.7	210	51.10
.....	2,496,774	528	21.5	15.3	181	46.09
.....	2,409,501	441	22.8	15.2	104	47.08
.....	2,269,104	391	32.5	22.9	233	60.62
.....	2,621,087	491	26.5	18.6	223	62.40
.....	3,050,154	577	21.9	15.1	234	43.38
.....	2,798,281	485	22.7	15.8	217	46.74
.....	3,073,171	507	20.0	15.7	227	47.13
.....	2,837,014	467	18.6	15.1	247	43.79
.....	2,991,050	395	14.9	14.0	234	41.50
.....	2,639,958	403	16.3	13.7	212	38.76
.....	3,609,250	563	18.5	11.8	192	49.10
.....	5,702,606	766	18.7	10.6	212	48.54
.....	5,682,663	800	17.1	9.5	152	48.83
.....	6,012,239	850	13.7	8.9	165	46.02
.....	5,680,087	722	12.2	8.6	157	43.35
.....	5,848,497	710	11.4	7.5	132	44.00
.....	5,888,517	638	11.1	6.8	140	45.80
.....	5,603,691	781	11.7	8.6	142	48.40
.....	6,367,809	690	15.9	10.1	158	49.60
.....	6,405,686	690	12.0	9.4	145	49.15
.....	8,064,253	769	15.7	8.2	146	52.60

1891	10,542,519	685	12.8	9.1	182
1892	11,103,926	572	11.2	8.8	238
1893	14,398,477	574	10.4	7.1	259
1894	15,484,014	584	9.5	5.7	285
1895	16,304,721	517	10.1	5.9	336
1896	16,863,477	477	10.9	6.5	379
1897	16,924,618	481	11.1	6.8	393
1898	16,354,061	513	12.0	6.8	381
1899	14,301,182	427	17.0	8.1	401
1900	14,116,551	391	16.6	9.3	433
1901	20,540,720	409	16.1	8.8	533
1902	18,988,491	347	11.9	9.0	562
1903	18,498,288	325	13.2	9.7	586
1904	18,343,160	307	13.3	9.7	592
1905	18,827,557	277	15.8	10.1	643

Lands are very extensive, the Quincy, by virtue of recent purcha owning the Pewabic lode, and a number of parallel cupriferous beds, f Hancock mine, on the northern shore of Portage Lake, to the Frankli mine, or about half way from Hancock to Calumet. The holdings Quincy now include lands formerly held by the Quincy, Pewabic, F Mesnard, Pontiac and St. Mary's companies, in order named, from s north.

The Quincy mine is opened on the Pewabic amygdaloidal bed, h strike of circa N. 30° E., with an average dip of 52° to 54° at surfac dip of approximately 37° 30′ at a depth of more than one mile, in th workings, the shafts following the pitch of the lode, on catenary curv bed averages about 20′ width, in the upper workings, but is materia rower at the bottom, with decreased copper values, the rock showi little heavy copper in the lower stopes, but being more uniform in va above. The Pewabic lode has an extreme width of 40′, at various poi is only 10′ to 15′ wide in the upper workings of the Mesnard shaft. Ninth Decade of the Nineteenth Century about 40% of the producti heavy copper, but this decreased to 9% in 1905. In the upper levels masses of native copper were found frequently, these ranging up to 3 in weight. Practically the entire bed is now mined, walls being stro requiring little timbering. Dry-walls are built of waste rock, in wide saving the cost of hoisting and the expense of extra timbering. Fi have been installed, and every precaution is taken against fire. Min carried to and from their work in man-cars holding 30 men, and h cables are inspected frequently, with every care taken to prevent ac Shafts are sunk mainly in the footwall, obviating the necessity of large quantities of payable stamp-rock in pillars. The southernmost dr the Quincy are under the city of Hancock, and about 3,000′ below mean datum of Portage Lake, while the northernmost workings, at No. 9 are fully two miles from the southern breasts.

In addition to the Pewabic amygdaloid, there is a footwall branch, as the Pewabic East Lode, underlying and paralleling the main bed, occasionally yields good returns. The mine was opened, 1848, on the amygdaloid, a parallel bed lying some distance west of the Pewabi which was abandoned, 1856, when the Pewabic was opened. The so West Lode, circa 300′ west of the Pewabic bed, has been opened from Nos. 4 and 7 by cross-cuts on the 30th, 39th, 40th, 44th and 49th level considerable stamp-rock has been extracted therefrom. About 150′ w the West Lode is another amygdaloidal bed, averaging 40′ in width carrying more or less copper, which possibly may prove workable at

ine. About 1,000′ west of the Pewabic bed is the Hancock amygdaloid, narrow, but fairly mineralized, and yielded an average of 21 lbs. fine per ton of rock stamped, when worked in the old Hancock mine, which ially above the present average return from the old Pewabic lode.

Quincy has been troubled greatly by air-blasts, these being violent nces brought about by the settling of superincumbent rock in the of miles of worked-out openings, causing violent compression of the where throughout the mine, giving considerable trouble and occasional life. The most serious disturbances from air-blasts, which practically ificial earthquakes, of local scope, felt for only a few miles distance urface, were experienced in February, 1906, and there seems reason to at these troubles will prove intermittently continuous for the balance mine's history, but there was less trouble from air-blasts during 1908 or several years previously.

he mine has compressor capacity for 260 power drills and operates about achines, in sinking, drifting and stoping, and the diamond drill is used ively in exploratory work. The mine has total hoisting and rockhouse ty for the production of 5,000 tons of stamp-rock daily.

lectric underground traction is in extensive use throughout the mine. lant was installed by the General Electric Co., tram-lines averaging about each in length, with gradients of 1.5% towards the shafts. The equip- includes 20 electric locomotives, each weighing 5,500 lbs., standing 3′ y 43″ wide and 9′ long, with draw-bar pull of 700 lbs. on a level track, hauling 4 or 5 three-ton rock-cars, at a speed of 6 to 8 miles per hour, an caring for each train. The haulage plant will be extended to No. 8 on the 49th level, from end to end of the mine. The underground trac- ower plant is on the 57th level of No. 2 shaft, having a 100-kw. direct t motor operating the haulage system. Tram-cars are unloaded into storage bins, built on the hanging-wall side of the shafts, there being ins on 2 levels of No. 2 shaft, 4 levels of No. 6 shaft and 7 levels of No. t. This system of storage obviates the loss of time by either the tram- r skips, and adds at least 25% to the hoisting capacity of the mine.

wing to the absorption of adjoining mines, from time to time, the Quincy are numbered irregularly, and are described hereinafter in order of ence from south to north, rather than in order by number.

o. 7 shaft, the southernmost, planned and sunk by Mr. John L. Harris, 62′ deep. This shaft is sunk on a catenary curve, leaving surface at an of 53°, and being bottomed at an angle of 37° 30′. The shaft was sunk , in 18 months, through very refractory rock, this speed being rendered ble by sinking and raising in 5 sections, simultaneously. This shaft ates 30 drills, and has a productive capacity of 1,800 tons daily, as com- d with a former capacity of about 1,000 tons.

The equipment of No. 7 shaft includes a steel shaft-rockhouse, 100′ high, large wings, which was remodeled, 1907, and nearly doubled in capacity, g given 750-ton bins. The rockhouse has a steam-hammer and two 24x36″ hers, latter replacing 5 smaller crushers. In 1904 this rockhouse required men for its operation, the force being reduced, 1905, by remodeling, to 16 , while after the changes of 1907, five men can handle 1,800 tons of rock ′, where 28 men were needed, five years previously, to handle less than this tonnage. It is this sort of progress that keeps the Quincy vigorous successful in its seventh decade of active production.

Equipment of No. 7 shaft includes an 8,000-h. p. Allis-Chalmers Corliss with 52x84″ cylinders and winding drums 28′ in diameter by 11′ 9″ carrying 8,000′ of 1½″ steel cable, the main shaft weighing 120,000 lbs. hoist can raise 6-ton skips, from a depth of 1½ miles, at a speed of 3,000′

per minute, hoisting being limited to this rate by an automatic cutoff, which also prevents overwinding. Starting a load of 6 tons from a depth of more than a mile, the hoist, if untouched, will check, without damage, after raising the skip a few feet higher than the appointed place in the shafthouse. There also is a 1,300-gallon bailer. The engine-house at No. 7 shaft is 58x94', with a 56x92' boiler-house adjoining, both of stone, with steel truss roofs, and there is a second boiler-house, each having eight 100-h. p. Roberts tubular return horizontal boilers.

No. 4 shaft, 860' next north of No. 7, is 4,186' deep, bottomed on the 51st level. The stoping ground tributary to No. 4 being nearly exhausted, and as a new hoist would be required for greater depth, the lower stretches of ground are reached from No. 7 shaft, by electric tram. Previous to abandoning No. 4, a more systematic search was made of the West Lode, which was successful, to the point of opening several years' reserves of stoping ground of fair tenor, though below the average grade of the Pewabic lode. Surface equipment at No. 4 shaft includes air-compressors of 40 drills aggregate capacity.

No. 2 shaft, 585' next north of No. 4, is 5,500' deep, being, except Quincy No. 6, the deepest in the Lake Superior district, outside of the Calumet & Hecla and Tamarack mines. This shaft operates 40 power drills and has a 1,300-gallon bailer for raising water.

No. 2 shaft has a new shaft-rockhouse, 160' high, of steel and reinforced concrete, built, 1908, by the American Bridge Co. Stamp-rock from the shaft is dumped onto grizzlies, with wide bars, smaller material falling into circular bins, whence it passes by gravity to the crushers and thence into the main rockhouse bin, which is circular, built of steel plates. The smaller mass copper passes through the grizzly-bars, and is picked out by workmen and dropped into a chute carrying it to a steam-hammer, there also being a chute for waste-rock. The grizzlies allow large pieces of rock to fall into a bin of reinforced concrete in front of the steam-hammer, where broken and sent to the main rockhouse bin through a chute, while mass copper from the steam-hammer is dropped into a tube of steel leading to a circular steel bin, with bottom of steel rails reinforced by concrete, which loads into railroad cars, through chutes with gates operated pneumatically.

No. 2 shaft has a special crushing plant for waste-rock, between the collar of the shaft and the rockhouse. Poor rock is dumped into a circular bin, and drawn by gravity to a crusher, going thence to circular storage-bins, from which it is drawn off into wagons or railroad cars, for use in railroad ballasting, road building and concrete work. When required, larger masses of rock are selected and stored for masonry work.

The surface equipment at No. 2 shaft is very heavy, being practically a duplicate of that at No. 7, including a powerful hoist. The 53x69' compressor house, of stone and steel, with fire-proof truss roof, houses two 60-drill cross-compound 2-stage condensing right and left hand Corliss air-compressors, so connected that air therefrom is available in any part of the mine, the cross-connection eliminating danger of inadequate air supply through disabling of either section. Steam from the compressor-plant exhausts into a dam built for the purpose. The boiler-house has 5 Hawley down-draft furnaces.

No. 6 shaft, 1,928' north of No. 2, is only 200' south of the Franklin line. This shaft has a 1,300-gallon bailer and operates 40 power drills. The shaft was 5,500' deep June, 1908, and production was somewhat decreased by No. 8 shaft taking considerable ground under the Franklin mine, previously tributary to No. 6. Equipment includes an Allis-Chalmers duplex hoist, with 22' 6" straight-face drum, raising 8-ton skips. There is a 100-drill 2-stage compound air-compressor, and a centrifugal feed-water heater, attached to

linder of the duplex hoist. The boiler-house, 56x75', has four 250-h. p. s water-tube vertical boilers and nine 100-h. p. locomotive firebox boilers, powerful fire-pump.

he Franklin mine lies next north of No. 6. The Quincy bought the old lin mine, area 160 acres, for $170,000, taking possession December, 1908, ranklin being closed down as soon as taken over by the Quincy. It is ain whether the old shafts of the Franklin will be used by the Quincy. o. 3 Franklin shaft is 3,200' deep, bottomed at the Quincy line, and has scram for some years.

lo. 5 Franklin shaft, 2,850' deep, also is bottomed at the Quincy line. stopes have been opened on the West Lode from this shaft.

lo. 8 shaft, also known as the Mesnard, is 4,168' north of No. 6, and is deep, the 24th level of No. 8 corresponding to the 42d level of No. 6. anent production was begun circa April, 1907, No. 8 operating 50 drills eing one of the largest producers of the mine. No. 8 shaft showed poorly e upper levels, but the lower workings, while by no means up to the y average of twenty years ago, in either quantity or quality of ore oped, show a wider and better mineralized lode than above, and the d is of very satisfactory average, the improvement beginning with the level and being marked below the 20th level, and the average of No. 8 arly or quite up to the present average of the old Quincy and Pewabic ings. The best ground apparently is shown to the southward, though ovement was noted, 1908, in the northern drifts, toward the Pontiac dary. Levels in No. 8 are opened, uniformly, at 135' intervals, and con- ion was secured July 15, 1906, between the 24th level of No. 8 and the level of No. 6, at a depth of 3,354', this level passing underneath the e workings of the old Franklin mine. The productive capacity of No. 8 is fully 1,000 tons daily.

The shaft-rockhouse at No. 8, of frame and structural steel, is 41x155' on ground and 150' high. Stamp-rock is dumped from the skips, as hoisted, grizzlies of 2" steel bars, placed 2" apart, at an angle of 45° in an upper n, with a lower section at 20° only, in which bars are 12" apart from r to center, the combination grizzly assorting rock automatically into grades, the fine stuff going to ore-bins and the coarse falling into two s, receiving equal portion, which feed direct to two rock-crushers on the below, no shoveling being required. The heavy rock, too large to pass 0" aperture in the lower section of the grizzly, falls to the floor, and is n by a trip-hammer. The new grizzlies save one-half on rock-house labor, greatly lighten the work of the remaining employes.

The power plant at No. 8, of structural steel and brick, is 140x162' in with a 9' basement under the engine room. Hoisting is by a Nordberg 2" duplex-cylinder engine, with double-conical drum of 12' 6" minimum 18' 6" maximum diameter, good for 6,000' depth. In a wing, built 1907, he south side of the power-house, is a 65-drill Nordberg 2-stage cross- ound air-compressor. The boiler room has ten 250-h. p. Parker and Burt rs, with steel and brick coal-bins that have direct rail connection over stle, and a 140' reinforced concrete smokestack, standing on a 16' base. pment at No. 8 shaft includes a change-house, with concrete walls and and a considerable number of dwellings for employes.

No. 9 shaft, 2,600' north of No. 8, is the old 100' Pontiac shaft, cut down compartment size, and was about 200' deep at the end of 1908, giving a ising showing at this shallow depth. The Pontiac tract never was a ucer, and has been but slightly explored.

The Quincy bought of the Arcadian, Nov. 19, 1906, for $750,000, a tract 00 acres, to the north of the Pontiac tract, carrying about one mile of

the Pewabic lode. These lands, formerly held by St. Mary's Mining Co., before bought by the Arcadian, are the N. ½ of Section 18, T. 55 N., R. 33 W., and the N. ½ and SE. ¼ of Section 13, T. 55 N., R. 34 W.

The surface plant of the Quincy is exceptionally complete. Near No. 2 shaft is the 62x145′ fireproof machine-shop, of stone, brick and steel, with truss roof, having a traveling crane with crane-run for entire length of shop, with a complete equipment of machinery and tools. A plastered brick tunnel, connecting the machine-shop, compressor plant and boiler-house, serves as a conduit for steam and air pipes. The blacksmith-shop is 50x154′, with a 50x90′ wing, of ashlar-finished redstone, with fireproof steel truss roof having 3 large ventilators, and is equipped with 12 forges, steam-hammer, fans, bolt cutters, drills, etc. Steam has been replaced by electric motors in the carpenter shop, smithy and roundhouse.

Miscellaneous buildings at the mine include a carpenter-shop, warehouse and a considerable number of miscellaneous structures required in the operation of an extensive mine. The general office is a handsome and substantial two-story and basement structure of ashlar-finished redstone.

Water for boilers, and for potable use at the mine location, is taken from Portage Lake, the pumping station, on the margin of the lake, being of ashlar-finished redstone, the pumps forcing water for a mile, against a head of 640′. A large coal-yard is located between shafts No. 2 and 4.

A private telephone exchange, with the central station in a 20x25′ frame building, has a switchboard for 100 instruments, with telephones installed in all parts of the mine, shops, mills and smelters.

The company owns several hundred dwellings at the mine location, and a considerable number of dwellings at the mills. The newer houses are mainly of 7-room size, on solid stone foundations, and the mine and mill locations are exceptionally neat. The company also has extensive holdings of valuable land, in and adjoining the city of Hancock, and portions of this land have been platted, from time to time, for residence purposes, and sold at good prices.

The company's private rail line, known as the Quincy & Torch Lake Railroad, built 1890, is 6 miles long, touching all of the shafts and shops at the mine, and at the boiler-house, wharves and coal-sheds at the mill, and is connected with the Mineral Range, Hancock & Calumet and Copper Range railroads. The rail line has solid rock ballasting and steel bridges, with a continuous down-grade haul between the mine and the mill. Equipment includes 6 locomotives, freight cars and nearly 150 hopper-cars for rock, the latter having automatic couplers and air-brakes. The roundhouse, near No. 7 shaft, has a 36x40′ addition containing a special machine shop, for the use of the railroad only.

The mills, 6 miles from the mine, at Mason, on Torch Lake, have a combined stamping capacity of about 4,500 tons daily. No. 1 mill, of wood, has 5 Allis-Chalmers 2-way stamps, with 20″ cylinders, using the coarse-stamping system, but 2 heads were given 24″ cylinders in 1908, with work begun on a third head. The heads with 24″ pistons take steam at 100 lbs. pressure, and it is probable that all the remaining stamps will be changed over to cylinders of 24″ size, credit for which is due Mr. Jas. W. Shields, the mill superintendent. On test, one 24″ head stamped 865 tons of rock in 24 hours, oversize being handled in another head, equivalent to handling oversize in rolls, as is done generally in the case of compound stamps. The heads with 24″ pistons have an average daily working capacity of 700 tons, occasionally reaching 800 tons, which compares favorably with the work of steeple-compound stamps. Dressing machinery at No. 1 mill includes 92 Hodge jigs and 32 Wilfley tables.

No. 2 mill, standing 630′ north of No. 1, is 132x216′ in size, of steel on stone foundations, with 180 windows, each having 13½ sq. ft. of glass,

nterior with light. This mill has three 20" Allis-Chalmers heads, et on foundations of heavy timbers and concrete, surmounted plate of 22 tons, a middle plate of 18 tons and a top plate of 18 lid iron castings, above which are the mortar-boxes of the stamps. s remodeled, as a steeple-compound stamp, in 1905, and this was ed, the water condensed from steam used being weighed, giving on the duty of the engine. The result of the very careful tests l the management to stick to simple heads. Finishing jigs and ave been replaced by 24 Wilfley tables, 8 for each stamp, assisted rd concentrators. Each stamp has 12 rough jigs, 6 Wilfleys for l 2 Wilfleys and 1 Standard table for slimes. Stamps have 1" reens for mortar-boxes and the mill has a settler, from which ken to the Wilfley tables. Regrinding is done by a Trent Chilean 3 jigs and 3 Wilfleys as auxiliaries. Regrinding of raggings in ne by an Allis-Chalmers Huntington mill. The mortars of all hydraulic discharges, as have the launders leading from the se giving about 60% of the total production of copper secured at By the adoption of hydraulic discharges and other improvements, of the stamp-heads has been increased about 25%, while changes have given an increased capacity of 30%, with labor costs reduced ss in tailings cut down 40 to 50%. About 35% of the present he mill is No. 3 grade mineral, carrying very fine copper. Mineral uch lower than formerly, averaging, 1907, only 63.2% fine copper. bins receive mineral in buckets by overhead trolley from the in No. 1 mill, and from No. 2 mill in hopper-cars drawn by an motive traversing a 650' track connecting the mills. The min- f concrete and cement, are kept at a temperature of 80° F., the water remaining from the wash, and gates are operated by s. There is a 54' platform-scale, with minimum weighing capacity nd maximum of 220,000 lbs.

x90' power-house, of steel frame, on stone foundations, at No. 2 pped with four 250-h. p. Wickes vertical water-tube boilers and a tack on a 30' foundation. There is an electric light plant, and n with the mills there is a machine shop and several minor build-

x54' brick and steel pumphouse at the mills has a 20,000,000-gallon ers vertical triple-expansion pump, and the old pumphouse has 3 a combined capacity of 21,000,000 gallons daily. Water is taken 6" tunnel, driven 100' under the bed of the lake. A 6x6' 6" tunnel nnects the mills, boiler-houses and pump-houses, this being bricked ed inside, and carrying both water and steam pipes.

iderable village, made up solely of employes and their families, has bout the mills.

tensive tailings of the mills at Mason are under lease to the Mason nd various experiments on reconcentration have been conducted, at ince 1902.

incy has 3 docks, of which the first is at Hancock, with a 40x416' a 64x124' warehouse, having deep water in front and railroad nd. A second dock, at the Ripley smelter, has a 350' shipping copper and a 250' coal-wharf. The third dock, at the Torch Lake 40x400' wharf, built of Washington fir, with 18' of water along- being a 300x300' coal-shed, of steel, with corrugated iron siding , having storage capacity for 80,000 tons of bituminous coal, this the annual consumption of the mine and mills. There are 3 steam capable of unloading 100 tons per hour each. These have 120'

steel towers, traveling on a track 22′ wide and 300′ long, running the length of the shed. The plant was built by the American Bridge Co., at of about $200,000, and effects a saving of circa 12 cents per ton on s used. The railroad reaches the coal-shed by a 650′ trestle, partly of and partly with steel bents, supported on 240 concrete piers.

The smelter, blown in Dec. 1, 1898, is at Ripley, on the shore of P Lake, opposite Houghton, just east of Hancock and only a half-mile fro mine. These works do a custom business, treating the mineral of the Fra Mass and Adventure mines, in addition to that of the Quincy. The pri buildings are of ashlar-finished redstone.

The 40x95′ mineral-house is reached by a 460′ trestle, mineral arr from the mills in hopper-bottom cars, and being dumped into storage whence it is drawn off, as required for smelting, into steel trucks, ru on rails under the gates of the bins.

The 84x144′ reverberatory furnace building has four 40-ton rever tories, and a second furnace building, erected 1904, has a 60-ton reverber furnace, equipped with an automatic casting machine. On arriving a reverberatory building, the trucks containing mineral are lifted by ele cranes, and contents dumped into the furnaces, which are top-charged. overhead trolley, in the main furnace building, permits handling large and cakes, and a trolley dipping system is in use for casting. Owing to of slag room, a new system has been installed, by which 3,000-lb. slag have replaced the diminutive pots formerly used. The slag-pots are tra from the furnaces to a 30′ hydraulic elevator, which raises the pots and d their contents over the end of a trestle.

A briquetting plant, built 1906, of concrete blocks, has 2 retorts of b iron, each 31′ long and 72″ in diameter, for briquetting low grade mi previous to smelting.

The smelting plant includes a cupola building with one blast-furnac engine-house, casting-house, cooper-shop, office, laboratory, coal-shed, a concrete machine-shop and a 50x100′ warehouse.

Production of fine copper has been as follows: 18,498,288 lbs. in 18,343,160 lbs. in 1904; 18,827,557 lbs. in 1905; 16,194,838 lbs. in 1906; 19,7 lbs. in 1907, and to the end of 1907 the mine had produced 390,274,0 fine copper. Production, 1908, was circa 20,000,000 lbs. fine copper. The makes about 100,000 oz. silver yearly. The last detailed annual figure 1905, gave a yield of 16.6 lbs. fine copper per ton of rock stamped, but r probably were about 15 lbs. only, in 1908. Production for last quar 1908 was circa 4,200 tons of stamp-rock daily.

But for the heavy outlay for improvements, begun in 1898, the w of which was questioned at that time by many shareholders, the Quincy would be a decadent property, with but a few uncertain years of life r ing, whereas, it secured, in 1908, the largest production in the history mine. The policy of growth, begun with the purchase of the Pewabic nearly 20 years ago, has been continued steadily, and the managem entitled to credit for following, consistently, the policy of expansio is necessary to the successful operation of any large industrial enterp the Twentieth Century.

QUINCY MINING CO.

Dead. Property sold, April, 1902, to Daly West Mining Co. Form Park City, Summit Co., Utah.

QUINTERA MINING CO., LTD. ME

Office: 11 Rue Boudreau, Paris, France. English office: 20 Bisho St., London, E. C., Eng. Mine office: Aduana, Alamos, Sonora, Mex. E *circa* 400 men. Jacques F. Kulp, chairman; A. Dubois, vice-chairman;

y; E. May, treasurer; J. Hebart, manager; C. Mahant, superin-
uel Valenzuela, mine superintendent; L. Le Bouticaut, mill super-
rancisco A. Esquer, smelter superintendent. Organized May 4,
aws of Great Britain, with capitalization £52,000, shares £1 par.
dividends of 2s. to 5s. Net earnings were £8,196, and dividends
in 1907.

6 claims, area 154 hectares, also a 2-hectare millsite, and the
eneguita and Calera, with total holdings of 6,000 hectares, in the
ct of Sonora and the Fuerte district of Sinaloa. Property shows
in trachyte, and contact deposits between trachyte and granite,
ore bodies, of which one, under development, is reported as a
, raking south, with strike of North 16° East, and dip of 80°, of
idth, traceable 500′, reported as proven to depth of 2,000′. Prop-
rily a silver mine, making lead and copper as by-products, ore
d by company to average 10% copper; 11% lead; 15% zinc; 200
d $5 gold per ton, principal copper ores being malachite and

is opened by shafts of 600′, 950′ and 540′, with circa 3,000′ of
owing 45,000 tons of concentrating ore and upwards of 10,000
locked out for stoping. Mine was opened in the Sixteenth Cen-
been working continuously.

it includes a 450-h. p. steam plant and 90-h. p. electric plant,
used at the mine, and 540 h. p. at the mill. There are 3 hoists,
gate horse power, good for 700′ depth, and a 4-drill Fraser &
compressor.

include a wooden carpenter-shop of 220 sq. ft. area, smithy of
fice and 3 dwellings. There also is a sawmill.

of wood, of 2,100 sq. ft. area, and of 45 tons daily capacity, has
amps.

entrator, of brick and lumber, of 3,024 sq. ft. area, has a No. 3
usher, 3 Wilfley tables and 6 slime tables.

ter, 2 miles from the mine, receiving ore by tramway, has a
& Chalmers blast-furnace, making matte carrying 40% copper,
r and 10 grams gold per ton, shipped to Ledoux & Co., New York,

n, 1907, was 14,500 tons of ore treated, yielding circa 350 metric
, carrying about 300,000 lbs. fine copper, 425,000 oz. silver and
old.

PPER MINING CO. **COLORADO.**

226 Seventeenth St., Denver, Colo. Mine office: Radium, Grand
arry S. Porter, president and treasurer; W. H. Gould, vice-presi-
Warren, secretary; preceding officers, A. Cunba and L. D. Cunba,
ganized under laws of Colorado, with capitalization $1,500,000,
Lands, 12 claims, in the Red Gorge district, having about 700′
with 2 tunnels, upper showing malachite and chalcocite, giving
to 45.7% copper, from a trace to 5 oz. silver, and from 20 cents
per ton.

NES CO. **ARIZONA.**

e: Globe, Gila Co., Ariz. Lands, 60 claims, circa 4 miles north
ominion, in a block of 1 to 2 miles width and nearly 4 miles
g eastward from Pinal Creek. Ten or more of these claims are
produced $10,000 to $20,000 each, from surface ores raised by
es. Idle.

INING CO. **ARIZONA.**

e: Crown King, Yavapai Co., Ariz. N. E. Paul, general man-

ager. Lands, 2 miles from Crown King, opened by a 160′ shaft and 340′ tu show a vein of 30″ to 6′ width, with an 8″ paystreak carrying argentife and auriferous copper ore of good average tenor. Presumably idle.

RAINBOW MINING CO. UT

Office: care of Ernest M. Fowler, secretary, Salt Lake City, Utah. M office, Alta, Salt Lake Co., Utah. Richard J. Jarvis, president and manager; G Saxon, vice-president; preceding officers, Andrew M. Jarvis, and Andrew Jackson, directors. Organized 1906, with capitalization $50,000, shares cents par. Has a 215′ tunnel, showing stringers of ore, and expects to cut t main vein at about 300′ length.

RAINBOW MINING & MILLING CO. IDAH

Office: Wallace, Idaho. Mine office: Osburn, Shoshone Co., Idaho. H Herman J. Rossi, president; G. E. Marlowe, secretary and treasurer; Chas. F. Merriam, consulting engineer. Lands, 6 claims, near the Gray, opened by 200′ tunnel on a 10″ vein of gray copper with iron and quartz gangue.

RAMBLER COPPER MINING CO. ARIZON

Dead. Lands sold, February, 1903, to Lion Copper Mining Co. Former at Stoddard, Yavapai Co., Ariz. Described Vol. IV.

RAMBLER COPPER MINING CO. WYOMIN

Dead. Was succeeded, Oct. 1, 1902, by Rambler Mining & Smelting C Formerly at Holmes, Albany Co., Wyo.

RAMBLER COPPER & PLATINUM CO. WYOMIN

Office: 710-145 LaSalle St., Chicago, Ills. Mine office: Holmes, Alta Co., Wyo. Frank M. Wootton, president; W. J. Sherwood, vice-president; M. Green, secretary; Frank C. Sheldon, treasurer; preceding officers, Dorche Mapes, A. C. Jones, W. C. Stone, W. R. Smythe, Jr., J. Thielman, Frank Day and J. B. Stephens, directors. Organized, circa 1907, as a merger Rambler Mining & Smelting Co. and New Lincoln Copper Co.

The lands formerly held by New Lincoln Copper Co. are 2 clai patented, area 40 acres, lying north of and adjoining the Rambler mine, which shafts of 30′ and 50′, sunk to cut the extension of the Rambler v are said to show auriferous and argentiferous copper ore.

The Rambler mine, 10 claims, area 200 acres, fairly timbered, is at head of Douglas Creek, on the crest of the Medicine Bow Mountains. M opened 1870, for gold, and relocated, 1900, for copper, shows a fault fissu grano-diorite, carrying a great variety of copper minerals in various st of alteration, associated with sundry rare metals in commercial quant comparatively free from such deleterious elements as bismuth, anti and arsenic. Ore includes a little native copper, in nuggets and dend associated with cuprite, in the upper levels, also melaconite, chalcocite, lite, chalcopyrite and chrysocolla, and is especially notable for cont large quantities of covellite, carrying gold, iridium, osmium, palladiu platinum, latter occurring as sperrylite. The ores have a gangue of posed granite, giving talcose alteration products, and carrying more pyrite, hematite and marcasite, all with small percentages of copper.

Development is by a 65′ vertical shaft, from the bottom of whic cline runs, on the vein, at an angle of 45°, with three levels opened, th being a 175′ vertical main shaft, connecting with the original working 2d and 3d levels. The mine has circa 2,800′ of workings, and was by former owners, to have 22,100 tons of ore, ranging from 20 to 45% blocked out for stoping on the first and second levels, but these figu exaggerated. Exact size of the ore body apparently is undeterm ores give assays ranging from 6 to 39% copper, with average smelte of 20 to 33% copper from carefully hand-selected ore. Assays of matte have given 6.75 oz. silver, 2.25 oz. gold and platinum combin

...n per ton. Cost of refining the matte ... is approximately $40 per ton of copper ... e improvements include a 15x44 ... y, office, assay office, sawmill, boarding house and ... is a small smelter having a 40-ton water jacket ... h the ore-bins by trestle, but the smelter has been ... nction was 249,196 lbs. fine copper. Property considered ... gement, which is practically same as that of the ... led favorably.

R MINING CO.

Company lost lands through failure to do assessment ... Rambler, Carbon Co., Wyo. Fully described Vol. VII

R MINING & SMELTING CO.

Succeeded, circa 1907, by Rambler Copper & Platinum ... Holmes. Albany Co., Wyo. Very fully described Vol. VII

BERG MINE.

...an mine: Clausthal im Harz, Prussian Province, Germany ... bergrat Richard, director ... and the Duchy of Brunswick, ...

lead, 11,522 kgs. silver and 96.5 kgs. gold, also quantities of various
ucts, including copperas, zinc sulphate, soda, etc. Production, 19
3,527,360 lbs. fine copper, and, 1907, was circa 3,500,000 lbs. fine copper

COMPAÑIA MINERA IGNACIO RODRIGUEZ RAMOS, S. A. M

Office: Jiménez, Chihuahua, Mex. Mine office: Baca, Hidalgo, Chi
Mex. Alfredo Rodriguez, president; Rafael L. Quiroz, general manager;
G. Aguirre, superintendent. Organized 1902, under laws of Mexico.
15 pertenencias. Country rock is limestone, carrying lenticular ore
One lense, under development, has a width of 78′ and length of 14
depth not ascertained, carrying malachite, azurite and galena, said to
5% copper, 25% lead, 6% zinc, 15 oz. silver and $8 gold per ton, ope
an 800′ shaft and tunnels of 400′ and 900′. Mine has a steam hoist a
electric drills, and ships ore to the American Smelting & Refining
reduction. Output, 1905, was circa 35,000 metric tons of ore, and
tion therefrom is estimated at 1,750,000 lbs. fine copper.

JOSÉ TOMÁS RAMOS i RAMOS.

Office and mine: Chalingá, Illapel, Coquimbo, Chile. Property
Llamaco mine, showing large ore bodies of 4 to 7% average copper ten
adapted to concentration, but output is hampered by carriage charge
pesos per metric ton to the railroad. Has a small smelter. Productio
was only 155 metric tons of 22% ore, secured with 14 workmen. W
communication and a modern reduction plant the property could be
considerable producer.

RAMSDELL-PARROT MINE. MON

Owned by Anaconda Copper Mining Co.

RANKIN COPPER MINING CO. WYO

Office and mine: Rawlins, Carbon Co., Wyo. Organized 1904, wi
italization $25,000. Idle and apparently moribund.

RANSON COPPER MINING CO. OF ONTARIO, LTD. ON

Office: Sault Ste. Marie, Mich. B. Frank, president; David Ru
secretary; D. J. Ranson, superintendent; R. H. Taylor, consulting e
Organized 1902, under laws of Ontario, with capitalization $3,000,000,
$1 par. Lands, 3,600 acres, in Chesley and Anderson townships, Algo
tario, said to show 14 veins, of which 6 contact veins have been ope
8 shafts, of 23′ to 75′ depth, veins averaging 25′ width and giving assay
up to 12% copper and 3 oz. silver per ton, from chalcopyrite. Has steam
Idle for several years and apparently moribund.

RARITAN COPPER WORKS. NEW J

Owned by United Metals Selling Co.

RARUS MINE. MON

Owned by Butte Coalition Mining Co.

RATTLER MINING CO. AR

Office: 740 Postal Telegraph Bldg., Chicago, Ills. Mine office:
Gila Co., Ariz. Kendric P. Crawford, president and manager; Wm. A.
superintendent. Organized under laws of Maine, with capitalization $
shares $1 par. Controls, through ownership of 53% of issued stock, t
Horse Mining Co. Lands, 6 claims, known as the Iron Horse group,
from Globe and circa 3 miles east of the Iron Cap mine, having a 55
compartment shaft, in a vein showing a 25′ outcrop, selected ores fro
have assayed up to 16% copper and 192 oz. silver per ton.

RAVEN MINING CO. MON

Office and mine: 68 Silver Bow Blk., Butte, Silver Bow Co., Mont.
Frisbie, president; John Berkin, vice-president and general manager
Poore, secretary; A. B. Curtis, treasurer; preceding officers, Donald C

Robt. A. Griffing, E. J. F. Rea and E. A. Slack, directors; W. Spencer Hutchinson, consulting engineer. Organized 1903, under laws of Montana, with capitalization $500,000, increased, 1907, to $1,000,000, shares $1 par; issued, circa $630,000. Bonds, $65,000, at 7%. On Sept. 11, 1908, the company had on hand $1,822 in cash, with bills payable of $16,500. American Trust Co., Boston, transfer agent. Annual meeting, second Tuesday in June.

Lands, 2 claims, fractional, area 23 acres. Property includes the Raven claim, owned outright, and a six-sevenths interest in the Snoozer mine, one-seventh of which is owned by the Red Metal Mining Co., which is the operating corporation of the Butte Coalition Mining Co. Lands, which are considered well located, have an east and west length of circa 2,000′, in line with the Mountain Consolidated mine.

The Snoozer claim has shafts of 75′ and 125′, with 5,780′ of workings, but was a producer, through the Buffalo shaft of the Anaconda company, until June, 1906, when the company was enjoined from working the Snoozer vein, which is subject to litigation, as the Butte & Boston claims that the vein apexes on the La Plata claim of that company, and, July, 1907, the lease of the Buffalo shaft was canceled by the Amalgamated Copper Co., and the claim advanced that the Snoozer vein apexed beyond the Raven side-lines. This matter remains unsettled. The Snoozer claim shows 4 veins, and ore produced therefrom, prior to suspension, averaged about 4% copper, 8 oz. silver and $1.25 gold per ton. The Snoozer has been opened on the 800′, 1,200′ and 1,500′ levels, by crosscuts from the Buffalo shaft of the Anaconda, the 1,200′ level showing a 4′ vein carrying high grade ore, while on the 1,500′ level the ore body was much wider. Previous to suspension, the Snoozer was shipping about 30 tons of ore daily, to the Washoe works.

The Raven claim, previously idle for some time, has been developed vigorously since Apr. 1, 1907. Development is by a 700′ air-shaft and a 1,200′ incline known as the Raven shaft, planned to be sunk to 1,500′. The depth of 1,200′ on the incline gives a vertical depth of about 1,000′, and there are circa 5,500′ of workings on the Raven claim. On the 900′ level a crosscut shows a 25′ vein carrying a hanging-wall paystreak averaging about 3.5% copper. On the 1,100′ level the vein is of about 30′ width, showing ore, below commercial grade, averaging circa 2% copper, with small gold and silver values. The Raven claim has 3 veins, and to depth of circa 500′ was a silver-gold mine, yielding ore averaging circa 16 oz. silver per ton, with fair gold values.

Equipment includes a 20x36″ hoist, good for one-half mile depth, and a 5-drill Ingersoll-Rand air-compressor, with 4 mine buildings.

From June 1, 1907, to Sept. 11, 1908, four sets of leasers, working in the upper levels, extracted gold and silver ores, on a royalty basis, company's proportion of values amounting to $2,771.

The standing of the company was injured, 1906, by rank manipulation of the share market, stock going up to $8 per share, then back again to 50 cents. In November, 1908, large shareholders came to the company's relief, by purchasing 30,000 shares of treasury stock, at par, giving the company funds sufficient to liquidate its floating indebtedness, and provide for further development. Property is considered promising, though it has not yet reached an assured basis.

RAVENSTHORPE SMELTER. **AUSTRALIA.**

Owned by Phillips River Gold & Copper Co., Ltd.

RAWLEY MINING CO. **COLORADO.**

Mine office: Bonanza, Saguache Co., Colo. David G. Weems, manager, at last accounts. Ores carry lead, silver and copper. Has steam and electric power. Presumably idle.

RAY CONSOLIDATED COPPER CO. ARIZONA.

Office and mine: Exchange Bldg., Colorado Springs, Colo. Branch office: 1107 Union Trust Bldg., Los Angeles, Cal. Mine office: Kelvin, Pinal Co., Ariz. Sherwood Aldrich, president; D. C. Jackling, vice-president; E. P. Shove, secretary and treasurer; Philip Wiseman, general manager; Seeley W. Mudd, chairman executive committee; preceding officers, C. M. MacNeill, Spencer Penrose, John Annan and J. G. Gordon, directors; Chas. H. Cutting, superintendent; A. Chester Beatty, consulting engineer.

Organized circa May, 1907, under laws of Maine, with capitalization $6,000,000, increased, circa 1908, to $8,000,000, shares $10 par; issued, $6,156,000. Bonds, $3,000,000, at 6%, dated July 1, 1907, due July 1, 1924, convertible into stock until July 1, 1914; issued, $1,156,000. Hayden, Stone & Co. have an option, until July 1, 1909, on $1,800,000 of convertible bonds remaining unissued. Company was said, November, 1908, to have circa $275,000 on hand. Company is a twin of the Gila Copper Co., and is controlled by the same interests as the Utah Copper Co. Morton Trust Co., New York, registrar and transfer agent.

Lands, 1,296 acres, on Mineral Creek, 6 miles from Kelvin, the nearest railroad point, also the townsite of Kelvin, bought of the Ray Copper Mines Ltd. The property shows a mineralized zone approximately 3,000′ wide and 12,000′ long, with prospects of further extensions, with a porphyritic belt, cut by numerous diabase dikes, having impregnations of low grade copper sulphide ore being disseminated in granules and veinlets through the country rock, the deposits being markedly similar to those at Ely, Bingham and Clifton. Depth of payable ore apparently is undetermined, but presumably is at least 200′ to 300′. Under the old management the property was said to show nearly 1,000,000 tons of ore, claimed to average 4.5% copper, the claimed ore tenor being much too high, as apparently the average tenor of the ore is 2 to 2.5% copper, though with some ore of higher grade.

Development is by a 300′ shaft and several working tunnels, but the ore body has been proven mainly by the use of 6 diamond drills, each averaging about 50′ of boring daily, holes being bored at 100′ intervals to depth of 3[illegible], the drill borings being estimated to develop between 4,000,000 and 5,000,000 tons of ore, averaging 2.25 to 2.5% copper. The former owners expended about $1,000,000, largely in misdirected work.

Transportation between the mine and mill is by a 6-mile narrow-gauge private railway, which was not entirely completed, at the end of 1908.

An old concentrator, enlarged, 1907, to 300 tons daily capacity, on Gila river, is planned to be enlarged to 1,000 tons size, as the first unit of a 6,000-ton mill. It is claimed that the ore can be concentrated 15 or even into 1.

The property formerly had a smelter, erected 1897, but never blown in, which was burned, March, 1906, the fire being a blessing in disguise, as the smelter was of no particular value for the present day.

Very extensive development was under way, 1907, with a force of about 600 men, until September, 1907, when the force was first cut in half, and then all work suspended, work being resumed, 1908, with a smaller force. The Ray Consolidated is a property of exceptional promise, and is under thorough competent management.

RAY COPPER MINES, LTD. ARIZONA.

Dead. Lands sold, circa 1907, to Ray Consolidated Copper Co. Formerly at Ray, Pinal Co., Ariz. Fully described Vol. VI.

RAY EXTENSION COPPER CO. ARIZONA.

Mine office: Ray, Pinal Co., Ariz. Organized circa July, 1907, under laws of Arizona, with capitalization $1,000,000, by D. A. Seaman and R. W. Sea[illegible]

COPPER & SILVER MINING CO. **MONTANA.**
d mine: Helena, Lewis & Clark Co., Mont. J. E. Teague, secre-
are in the Lump Gulch district, east of the Liverpool mine, be-
ads of Strawberry and Shingle Gulches, on the western slope of
fountain. Development is by two shafts, one of 140', and a 240'
ped a little ore, 1907.

PPER MINING CO. **CALIFORNIA.**
ormerly at Lewis, Mariposa Co., Cal. Described Vol. VI.

LLION COPPER CO. **ALASKA.**
517-131 State St., Boston, Mass. Property is in Alaska. Presum-

MINING CO. **NEW MEXICO.**
ice: Hillsboro, Sierra Co., N. M. Has auriferous and argentif-
ore. Idle and presumably moribund.

MINERA REAL DEL MONTE y PACHUCA. **MEXICO.**
50 Congress St., Boston, Mass. Mexican general office: 11 San
exico, D. F. Mine office: Pachuca, Hidalgo, Mex. Pablo Mar-
, president; A. F. Holden, managing director; preceding officers,
lge, E. A. Clark and Señor Eiguero, directors; Edw. E. Merrill,
A. Prosser, metallurgical superintendent; T. H. France, consulting
apitalization 225,000 pesos, shares 100 pesos par. Is controlled,
rship of practically entire stock issue, by United States Smelting,
ining Co. Paid first dividend, under new management, April, 1908.
16 claims, in 2 districts, principal mines being the Camalia, Bar-
timoctzin at Coreteza, and the Cabrera, Aviadero, Santa Brigida,
d Resquicio at Real del Monte.

l del Monte is possibly the oldest Spanish mine in Mexico, dating
553, and the patio process of reduction was first used at this mine,
ctric power is used throughout, 5,000 h. p. being taken from the
ectrica y Irrigadora de Hidalgo. Equipment includes 6 powerful
s, capable of raising 10-ton loads at average speed of 500' per
pped with 3-phase, 440-volt, 50-cycle motors. Has electric pumps
ia and Cabrera mines, and steam pumps in the Dolores, San Juan
d mines.

mprises various mills for ore reduction, including the Loreto mill
using the patio process, and the Hacienda de Beneficio San An-
la, using the barrel process, with a capacity of 12,000 tons of ore
Loreto mill has been remodeled and increased to 250 tons daily
ng electric power throughout. The new Guerrero mill, opened Apr.
ring 40 stamps, tables and a cyanide plant, is rated at 300 tons
y.

on, under old management, averaged 65,000 metric tons of ore
ing an average of better than 1 kilogram silver per metric ton.
new works is practically 3 times that of the old.

ON MINERA REAL DEL MONTE, **MEXICO.**
y BILBOA.
ice: Ojocaliente, Zacatecas, Mex. H. Dalonne, manager, at last
as cupriferous silver-lead ores. Presumably idle.

OLD, SILVER & COPPER CO. **MEXICO.**
ice: Alamos, Sonora, Mex. J. L. Shepard, general manager; D.
intendent. Has argentiferous copper ores, with steam power, em-
40 men.

INING CO. **MEXICO.**
eturned unclaimed from former office, Guadalajara, Mex. Mine
lpa, Sayula, Jalisco, Mex. Silviano Camberos, manager, at last

accounts. Lands, 25 pertenencias, near Chiquilistlán, 50 kilometers northwest of Sayula, including the Cuprifera, Rinconada and Sin Nombre groups. Ore occurs in "mantos," or blanket veins, and in fissures, giving assays up to 60% copper, 2 kgs. silver and $10 gold per ton. A little ore, smelted in adobe furnaces, at the mines, has given good returns. Presumably idle.

REBELJ & VIS COPPER MINES, LTD. SERVIA.

Office: care of A. F. V. Wild, 28 Budge Row, London, E. C., Eng. Mine office: Rebelj, Vljewo, Servia. Organized Nov. 21, 1907, under laws of Great Britain, with capitalization £25,000, shares £1 par.

R. E. BRUNER COPPER CO. ARIZONA.

Office: 812 Grand Ave., Kansas City, Mo. Mine office: Patagonia, Santa Cruz Co., Ariz. R. E. Bruner, president; Rea M. Bruner, vice-president; Glen L. Bruner, secretary and treasurer. Organized June 24, 1907, under laws of Arizona, with capitalization $3,000,000. Company reported 680,000 shares unissued, Aug. 6, 1908.

Lands, 8 claims, unpatented, near the Anaconda-Arizona and Mansfeld. A 54′ tunnel, on the Mescal claim, is said to give indications of argentiferous lead and copper ore, and company claimed, August, 1908, to have opened the vein for nearly a mile in length, presumably by trenching, and planned driving a tunnel at least 500′ on the Mescal claim.

RED BIRD MINING CO. MONTANA.

Office: Helena, Mont. Mine office: Austin, Lewis & Clark Co., Mont. J. M. Clements, president and treasurer; Frank Jacquemin, vice-president; A. A. Pelletier, secretary and general manager; preceding officers, Robert Lucas and C. O. Clark, directors. Organized Aug. 18, 1902, under laws of Montana, with capitalization $1,500,000, shares $5 par. Paid dividends of $72,000, to end of 1905. Lands, 7 claims, area 140 acres, in the Greenhorn district, carrying 15 fissure veins, of which 2, of 5′ average width, are developed by the 400′ Red Bird shaft and the 300′ Copper Hill shaft. The Copper Hill mine shows sulphide ore averaging 1.3% copper, with a 30% excess of iron, in a 60′ vein. The Red Bird mine has about one mile of workings, claimed to put 250,000 tons of ore in sight. Estimated average ore values of the Red Bird, as given by a former management, were 21% copper, 45% lead, 35 oz. silver and $5 gold per ton, this being manifestly a great exaggeration. Has a 180-h. p. steam plant with 4 hoists and a 4-drill air-compressor. Has 5 mine buildings. Presumably idle.

RED CANYON MINING CO. NEVADA.

Office: 703 Marquette Bldg., Chicago, Ills. Mine office: Gardnerville, Douglas Co., Nev. H. P. Chesley, president; B. F. MacKay, vice-president; A. F. Doyle, secretary and manager; C. L. Doyle, treasurer; preceding officers, L. C. Hunter, W. L. Thompson and P. C. Wilder, directors; H. C. Jessen, superintendent. Organized February, 1907, under laws of Arizona, with capitalization $1,000,000, shares $1 par.

Lands, 5 claims, area 100 acres, well watered and fairly timbered, said to be in the Yerington district, but mine office is in the adjoining county. Property is said to show 3 veins, with northeasterly and southwesterly strike, traceable 7,500′. The main vein is said to be 30′ to 100′ wide, with dip of 30° to 45°, showing cuprite, malachite, bornite and chalcopyrite, assaying 2 to 6% copper, with some lead. Company claims to have exposed 13,000 tons of ore averaging 8% copper and $1.30 per ton in combined gold and silver values. Development is by 6 shafts of 30′ to 75′, and 6 tunnels of 60′ to 350′. Company is said to plan a 100-ton smelter.

RED CLOUD MINING CO. CALIFORNIA.

Office: Los Angeles, Cal. Mine office: Salton, Riverside Co., Cal. E. H. *Gould*, superintendent. Has auriferous and argentiferous copper and lead

with steam and gasoline power, 2-stamp mill, concentrator and 80-ton ter. Idle.

CLOUD MINING CO. **MEXICO.**

Dead. Apparently was successor of Consolidated Gold & Copper Co., and merged, circa August, 1908, in Kansas-Cananea Copper Co. Lands, circa les south of La Cananea, were said to show considerable ore of low average er tenor. Formerly at La Cananea, Arizpe, Sonora, Mex.

CROSS MINING CO. **WASHINGTON.**

Mine office: Index, Snohomish Co., Wash. David Boyle, president; D. canlan, treasurer; R. W. Emerson, secretary. Organized 1906, under laws Washington, with capitalization $1,000,000. Lands, 15 claims, in the Wal- district, near the Bunker Hill Mining & Smelting Co., said to show 4 , 3 of 7′ to 8′ average width, and one, in granite, of 25′ claimed and ap- ntly about 8′ actual average width, opened by a 65′ tunnel.

DING GOLD & COPPER MINING CO. **CALIFORNIA.**

Office: 15-951 Eddy St., San Francisco, Cal. Letter returned unclaimed former mine office, Redding, Shasta Co., Cal. Has a bad habit of ging offices and leaving no address behind. Letters have been returned rious times from former offices at Oakland and San Francisco. H. D. , president; R. W. Mayhew, vice-president; Thos. Gilbert, secretary; J. H. hton, superintendent; preceding officers, A. Ahnefeld and T. S. Rasmussen, tors. Organized under laws of South Dakota, with capitalization ,000. Has authorized a bond issue at 6%. Lands, circa 30 claims at h of Middle Creek, and sundry claims at Clear Creek, in the Muletown ct, circa 7 miles west of Redding, also placer gold claims. Company ed, 1905, to be developing a hydro-electric power plant, and claimed to building a 500-ton smelter. Is regarded with suspicion.

EMPTION COPPER MINING & MILLING CO. **ARIZONA.**

Office: Kingman, Ariz. Mine office: Chloride, Mohave Co., Ariz. Robt. rguson, president and general manager. Has auriferous and argentiferous zed ores of copper.

FOX MINING CO. **BRITISH COLUMBIA.**

Mine office: McGuigan, Yale district, B. C. Has argentiferous lead and r ores, slightly developed. Idle several years.

GULCH GOLD-COPPER MINING & MILLING CO. **COLORADO.**

Office: care of E. G. Bettis, president, Cañon City, Colo. Mine office: erfield, Frémont Co., Colo. Wm. T. Bridwell, vice-president; M. M. Van , secretary. Is capitalized at 3,000,000 shares, presumably $1 par. Lands, aims, in the Red Gulch district of Frémont county, 83 acres in the Ilse ict of Custer county, and sundry claims in the Monarch district of Chaffee ty, Colorado. The Red Gulch group has a 210′ shaft, developing silver- ore, and shipped, 1907, some ore of good grade.

HILL MINING & SMELTING CO. **CALIFORNIA.**

Office: care of C. B. Allen, secretary, Los Angeles, Cal. Mine office: or, San Bernardino Co., Cal. Dr. C. J. Allen, president; J. W. Jackson, president. Lands are about 10 miles from Victor. Idle and apparently bund.

HORSE COPPER CO. **IDAHO.**

Mine office: Springston, Kootenai Co., Idaho. Jasper Neederhood, presi- ; John Neederhood, vice-president; preceding officers and Geo. Ripley, tors; Rudolph A. Jonas, manager. Organized 1904, under laws of Idaho, capitalization $1,500,000, shares $1 par.

Lands, 18 claims, having a shaft and a 748′ tunnel, with circa 1,500′ of tings, showing ore said to assay 18% copper, with high gold values. Equip- t includes a 3-drill *air-compressor.*

Apparently the local officers stand well, but the company's advertis ments, through H. J. Leighton, fiscal agent, were outrageously exaggerated an highly misleading.

RED JACKET & BISBEE DEVELOPMENT CO. ARIZONA

Dead. Formerly at Bisbee, Cochise Co., Ariz. Fully described Vol. IV.

REDMAN MINING, MILLING & SMELTING CO. ARIZONA

Office: 17 Battery Place, New York, N. Y. Mine office: McCabe, Yav apai Co., Ariz. W. D. Wintemute, secretary and treasurer; John Derry, supe intendent. Organized under laws of Arizona, with capitalization $2,500,00 shares $1 par. Lands include claims in Nevada and Mexico, with princip group one mile northeast of McCabe, said to have about 1,000' of working showing a 30" vein of sulphide ore on the 100' level. Plans a 10-stamp mi and concentrator. Management makes promises more lavish than are wa ranted by development secured.

RED METAL MINING CO. MONTANA

Office: 42 Broadway, New York, N. Y. Mine office: Butte, Silver Bo Co., Mont. Thos. F. Cole, president; W. D. Thornton, vice-president; percedi officers, J. C. Lalor, C. D. Fraser and James O'Grady, directors; Arthur Carson, general manager; Geo. Moulthrop, general superintendent. Organiz Feb. 23, 1906, under laws of New York, with capitalization $11,000,000, shar $100 par. Entire stock issue is held by the Butte Coalition Mining Co., and t Red Metal Mining Co. is a holding company for the Butte Coalition, direct tit to lands being vested in the Red Metal. Holdings supposedly include lands d scribed under the title of Butte Coalition Mining Co., also stock control of t Alice, and a few other small properties, including a seventh interest in t Snoozer mine of the Raven Mining Co.

RED METAL MINING CO. NEVADA

Office: care of Alex Colbath, secretary, Salt Lake City, Utah. Mi office: Luning, Esmeralda Co., Nev. Lemuel U. Colbath, president; W. Craig, vice-president and general manager; preceding officers, W. Wrightma Wm. Pischel and Dr. John T. White, directors. Organized circa January, 190 under laws of Colorado, with capitalization $1,000,000.

RED MOUNTAIN GOLD & COPPER REDUCTION CO. WASHINGTON

Dead. Formerly at Chelan, Chelan Co., Wash.

RED MOUNTAIN RAILROAD, MINING & SMELTING CO. COLORADO

Office: 1004 West End Trust Bldg., Philadelphia, Pa. Mine office: Re Mountain, Ouray Co., Colo. Geo. Crawford, general manager; W. C. Aste superintendent. Lands include the Yankee Girl, Genesee and Vanderbilt pro erties, carrying auriferous and argentiferous copper ores. Has steam an electric power.

REDOUBTABLE GOLD & COPPER MINING & MILLING CO. COLORADO

Office: Salida, Colo. Mine office: Turret, Chaffee Co., Colo. David He ton, president; W. W. Roller, vice-president; J. W. Calhoun, treasurer; J. Hunt, secretary; preceding officers and Geo. Sullivan, directors. Organize circa 1907, under laws of Colorado, with capitalization $1,000,000.

Property, formerly held by Par Value Gold & Copper Mining Co., includ a 3-year bond and lease on the Gold Bug and Mandate claims. Lands sho 4 fissure veins of about 3' average width, carrying oxidized and sulphide ore former said to average 5% copper, 3 oz. silver and $10 gold per ton, opened b shafts of 200' and 400', with about 3,000' of workings.

RED RIVER COPPER CO. NEW MEXICO

Mine office: Red River, Taos Co., N. M. Geo. B. Paxton, superintendent *Property* is the Anaconda mine. Has steam power. Presumably idle.

REFORMA MINING CO. MEX

Dead. Formerly at Fuerte, Sinaloa, Mex.

REFUGIO SYNDICATE, LTD. MEX

Office: 3 Princes St., London, E. C., Eng. Letter returned unclaimed f former mine office, La Cananea, Arizpe, Sonora, Mex. S. A. Bird, chairm Henry H. Knox, consulting engineer; J. S. Dare, secretary. Organized J 30, 1905, under laws of Great Britain, with capitalization £11,250, in 1,00 shares and 10,000 ordinary shares of £1 par each, and 5,000 deferred sh of 1s. par each. Lands, 6 groups of copper claims, area 382 hectares. Pre ably idle.

REID-NEWFOUNDLAND CO. NEWFOUNDLA

Mine office: New Bay, Newfoundland. Donald McKenzie, superint ent. In 1907 was sinking a shaft planned to be 100′ deep, for prospec purposes.

COMPAÑIA MINERA LA REINA. MEX

Dead. Lands sold, circa 1907, to Mexican Mines Syndicate, Ltd. Form at Cusihuiriáchic, Iturbide, Chihuahua, Mex. Fully described Vol. VII.

COMPAÑIA MINERA REINA DE COBRE. MEX

Mine office: Ejutla, Oaxaca, Mex. Capitalization 100,000 pesos. Butler, general manager; Juan de Peza, superintendent, at last accounts. erty is the Luna de Oaxaca mine. Presumably idle.

MINA REINA DE COBRE. MEX

Mine office: Alamos, Sonora, Mex. Alfredo R. Cano y Ca., owners; G. Cano, manager. Has auriferous and argentiferous copper ores.

COMPAÑIA MINERA REINA DE COBRE DE SONORA. MEX

Letter returned unclaimed from former office, Nogales, Sonora, Mex. office: Santa Ana, Magdalena, Sonora, Mex. John Henderson, superinte Has auriferous and argentiferous copper ores. Has steam power, empl circa 30 men, at last accounts.

REINA COPPER CO., LTD. S

Office: 18 Walbrook, London, E. C., Eng. M. Graham, chairman. (ized Aug. 13, 1906, under laws of Great Britain, with capitalization £ shares £1 par, to acquire copper mines in Spain. Presumably idle.

REINDEER COPPER & GOLD MINING CO., LTD. ID

Office: 510 Bank St., Wallace, Idaho. Mine office: Mullan, Shoshon Idaho. F. C. Norbeck, secretary; Norman Ebberley, manager. Appare a Siamese twin of the Reindeer Copper Mining & Milling Co., Ltd. La claims, on Willow Creek, said to have a vein carrying a paystreak of 16 t copper tenor, with 3′ to 6′ of copper ore of concentrating grade. Is de ing by a tunnel, driven jointly with Copper Queen Mining Co., planned 3,000′ long. Has steam power and an air-compressor.

REINDEER COPPER MINING & MILLING CO., LTD. ID

Office: 510 Bank St., Wallace, Idaho. Mine office: Mullan, Shoshon Idaho. H. A. Keough, president; F. C. Norbeck, secretary. Appare Siamese twin of the Reindeer Copper & Gold Mining Co., Ltd., and imp to tell "t'other from which."

REINDEER MINING CO. ID

Dead. Succeeded by Reindeer Copper & Gold Mining Co., Ltd. Fo at Mullan, Shoshone Co., Idaho.

REINS COPPER CO. MONT

Office and mine: 46 East Broadway, Butte, Silver Bow Co., Mont. J. M. Guffey, president; John P. Reins and Asa Childs, vice-presidents; *ing officers*, Wm. P. De Armit, Hon. John Miller, Frank J. Weixel, E. W *land*, Geo. W. Stapleton, W. W. McDowell, E. D. Leavitt and Guy Sta

ment is on the Little Gem group, one mile from Tenabo, showing a c deposit between rhyolite and sedimentary rocks, carrying auriferous a gentiferous copper carbonates and chalcopyrite, with quartz gangue. 250′ incline shaft, sunk at an angle of 22°, showing an ore body ranging a few inches to 5′ in width, giving assays up to 31.1% copper, 122 oz. silv $9.60 gold per ton.

RELIANCE MINING & MILLING CO. PENNSYLV

Office: Lancaster, Pa. Mine office: Hunterstown, Adams Co., Pa. sumably idle.

RENDALL ORE REDUCTION CO. ARIZ

Office: 16 State St., Boston, Mass. Mine office: Gila Bend, Maricop Ariz. Chas. S. Ashley, president; Leonard L. Allen, vice-president; H. C Slack, secretary; A. D. Lee, superintendent.

Property is the Ajo mine, an antigua, opened A. D. 1763, and rec circa 1861, when native copper and considerable rich ore, said to have worth $300,000, was shipped to San Francisco and Swansea. Property is pered by lack of rail transportation. Mine has a 150′ shaft, showing good average tenor. During idleness of mine considerable regulus wa duced by deposits on old rails and pipes.

Reduction plant, rated at 50 tons daily capacity, uses the Rendall p which is claimed to treat, with equal facility, all classes of copper or cluding oxides, carbonates, sulphides, chloride, silicates and arsenides, is claimed that average ores can be treated at cost of $1 per ton, with tion of 95 to 98% of values, which claims seem very sweeping. The pla a special upright furnace, practically air-tight, with suction draft op above the charge. Ore is heated to low incandescence by gases from coal or oil, and at a proper degree of heat the combustion draft is inc fuel supply shut off, and a specially fluxed hot blast admitted to f causing chemical reactions by which the volatile elements are said to be off. The special fluxing gas is said to prevent oxidation, carbonizat chlorination of the ores, and it is claimed that copper, gold and silver in suspension, as the gangue rock of quartz or limestone is not fused. difficult to understand just what is volatilized, if neither metals nor rock are fused, and the utility of the volatilization process is not ap After volatilization, the ore is plunged into a vat containing water, w said to shock the gangue, and assist in breaking it up. Ore is then through a set of rolls, crushed fine, and copper ore concentrated or tre an arastra or Chilean mill, if containing high gold or silver values.

RENO-YERINGTON COPPER CO. NE

Mine office: Yerington, Lyon Co., Nev. S. H. Baker, manager. north of the Bluestone, have a 700′ tunnel, 200′ of which is said to show of 8′ average width, carrying ore of 3 to 4% copper tenor. Presumabl

REPUBLIC CONSOLIDATED MINING & MILLING CO. COL

Dead. Formerly at Idaho Springs, Clear Creek Co., Colo.

REPUBLIC MINES CO. NEW M

Office: 526 Exchange Bldg., Denver, Colo. Mine office: Lucer Co., N. M. Felix J. Woodward, president; Walter Littlefield, vice-pr Marcus Finch, secretary, treasurer and general manager. Organized 1903, under laws of Colorado, with capitalization $500,000, shares $1 sued, $490,000.

Lands, circa 7,500 acres, patented, half freehold and half held und and lease, known as the Constitution group, 30 miles from a railroad, ing for 8 miles along Coyote Creek, from Mora river to the adjacent tains, showing a series of 3 parallel cupriferous beds of slate and are shale, alternating with limestone, having an approximately meridional

ty has upwards of 120 openings, mainly shallow pits, showing cop- al workings being a 50′ shaft and several tunnels, longest 650′. The ls are of 3′ to 8′ thickness, with 3 minor ledges, said to show con- chalcocite, presumably in connection with oxidized ores, giving says of 8 to 17% copper, with an estimated average tenor of 6%. dans building a small smelter with a reverberatory furnace.

) MINING CO. **ARIZONA.**
office: Johnson, Cochise Co., Ariz. Lands, 9 claims, including the lican mine, having a 350′ shaft; the Republic Extension mine, with 50′, 75′ and 150′, and the Mammoth mine, having incline shafts of 00′. Property shows auriferous and argentiferous sulphides, up to per tenor.

) SMELTING CO. **COLORADO.**
and works: Leadville, Lake Co., Colo. Capitalization $500,000. s the remodeled 500-ton smelter, with 3 furnaces, formerly owned ston Gold-Copper Co. Presumably idle.

COPPER CO. **ARIZONA.**
Merged, Feb. 19, 1907, in Cornelia Copper Co. Formerly at Gila a Co., Ariz. Described Vol. VII.

TION MINING & SMELTING CO. **WASHINGTON.**
Lands sold, circa 1907, to Dominion Copper Co., Ltd. Formerly at Ferry Co., Wash.

E COPPER CO. **MICHIGAN.**
Wound up. Lands sold, 1905, to Keweenaw Copper Co. Formerly Mine, Keweenaw Co., Mich. Fully described Vol. II.

REVANCHA. **MEXICO.**
office: Ojocaliente, Zacatecas, Mex. J. Incarnacion Spina, owner; manager. Has argentiferous lead and copper ores, with a Chilean team power.

MINING CO. **ARKANSAS, UTAH & WASHINGTON.**
Formerly in Stevens county, Washington. Described Vol. VII.

MINING & MILLING CO. **WYOMING.**
Formerly at Encampment, Carbon Co., Wyo. Described Vol. VI.

COPPER MINING CO. **ARIZONA.**
Lands sold, Oct. 15, 1903, to United Arizona Copper Co., Ltd. at Vekol, Pinal Co., Ariz.

GOLD-COPPER MINING CO. **BRITISH COLUMBIA.**
returned unclaimed from former office, Spokane, Wash. Mine office: Boundary district, B. C. W. C. Lyall, attorney. Organized 1906, alization $1,000,000, shares $1 par. Idle and apparently moribund.

SILVER & COPPER MINING CO. **UTAH.**
office: Alta, Salt Lake Co., Utah. Lands are on the south fork of ttonwood.

RE MINING CO. **ARIZONA.**
Muskegon, Mich. Mine office: Safford, Graham Co., Ariz. Dr. , president; J. B. Barlow, secretary and treasurer. Organized 1903, of Arizona, with capitalization $1,000,000, shares $1 par. Lands, area 320 acres, in the Lone Star district, showing fissure veins, de- a 2-compartment incline shaft of 540′, with 700′ of underground Has a 28-h. p. steam hoist. Idle several years.

D MINES & INVESTMENT CO. **COLORADO.**
office: Leadville, Lake Co., Colo. Jesse F. McDonald, manager. ide the Rattler and Reconstruction mines, carrying gold, silver, lead ores. Has steam power. Presumably idle.

REY DEL ORO MINING CO. MEXICO.

Mine office: Mulatos, Sahuaripa, Sonora, Mex. Is controlled, through entire stock ownership, by the Greene Gold-Silver Co. Property is the Mulatos mine.

COMPAÑIA MINERA LOS REYES. MEXICO.

Mine office: Zitácuaro, Michoacán, Mex. Rafael Rodriguez Gil, manager, at last accounts. Has a tunnel, showing copper ore. Presumably idle.

REYNOLDS-ALASKA DEVELOPMENT CO. ALASKA.

Office: 43 Exchange Place, New York, N. Y. Mine office: Valdez, Prince William Sound district, Alaska. C. M. Baldwin, president; Percy Brundage, vice-president; Hon. John G. Brady, secretary; J. Frank Birdsell, treasurer; preceding officers, Horace E. Kistler, E. T. Teter, D. B. Hawes, O. W. Cobb, Omar J. Humphrey, A. E. Austin, H. M. Coffin, Chas. H. Kingsbury, J. J. Blackmore and W. S. Burrows, directors; Blamey Stevens, engineer; J. W. Spaulding, superintendent. Organized 1903, under laws of Washington, with capitalization $3,000,000, shares $1 par, in $1,000,000 cumulative 6% preferred and $2,000,000 common shares; issued, $2,632,906. Bonds, $500,000, twenty-year 6% gold bonds, authorized March 3, 1908; issued, none. Company paid dividends, to Oct. 1, 1908, of $38,644.72 on preferred stock, which was wrong, as the company was not in a position to earn any dividends. Company is said to have offered to pay 6% on preferred stock, from date of issue, and 6% on common shares thereafter. In March, 1908, the company had an indebtedness of circa $280,000. Washington Trust Co., Boston, registrar; Beacon Trust Co., Boston, transfer agent. Annual meeting, first Tuesday in April.

The Reynolds string of promotions included companies formed to carry on a great variety of businesses, including hotels, a dray-line, newspaper, building construction, smelting, laundering, merchandising, and the sale of musical instruments and sheet-music. Company controls the Copper River Lumber Co., with sawmills and yards at Valdez, and also holds, at Valdez, 20 parcels of real estate, including various hotels, warehouses, dwellings, etc.

Lands, 62 claims, area circa 1,200 acres, patents applied for, also an 80-acre millsite and 6,000 acres of coal and oil lands, in several different groups, in 2 different localities in the Valdez district. The coal and oil lands are not productive. The various properties show slate, greenstone and porphyry, carrying various contact deposits between slate and greenstone.

The Boulder Bay group, 23 claims, area 460 acres, on the Kenai peninsula, shows a contact deposit between greenstone and slate, carrying chalcopyrite, assaying up to 11% copper and $3 gold per ton, but probably averaging 2 to 4% in copper tenor, developed by 2 tunnels. Equipment includes a 60-h. p. boiler and a 5-drill Rand air-compressor.

The Aurora mine, at Kachekmak Bay, Cook Inlet, is a gold property, where considerable money was spent, and apparently little ore found. At one time a mill was planned for this property.

The Latouche Iron Mountain group, 20 claims, includes the Duchess and Blue Fox properties, on the west coast of Latouche Island, circa 60 miles west of Boulder Bay. The Blue Fox mine has a 4' vein of ore, of about 7% estimated copper tenor, which it was planned to develop by shaft. The Duchess mine, opened by tunnel, shows ore of low grade, but in larger quantities than found in the Blue Fox, having a vein estimated by company as of 100' width, traceable circa 700'. Another authority states that there is an ore zone up to 250' in width, traceable nearly one mile. Development is by tunnel and crosscuts, showing a large body of low grade copper ore, intersected by several high grade ore bodies.

Equipment includes a 200-h. p. hydro-electric installation, with a flume and steel pipe leading from Big Falls Creek to a Pelton wheel, direct-connected to

)-kw. generators. There is a 50-h. p. hoist and 2 Rand air-compressors, rills aggregate capacity, with 6 air drills and 10 Ingersoll-Temple electric

nprovements include a sawmill, electric light plant, 3 steamers, a store, hotel and barber-shop.

he company is giving tentative consideration to the erection of a 1,000-ton r. The management estimates that the mine should have a mean prob- re capacity of 3,000,000 tons.

enry D. Reynolds was arrested, April, 1908, on a secret indictment re- l against him by a Federal grand jury in Massachusetts, for using the to defraud, but wrote, Apr. 28, 1908, stating that he had just resumed l of the company and its subsidiary corporations, including the Alaska Railway and 13 other companies comprising the so-called Reynolds- a system. The company, together with its associated bank, railroad and rial enterprise, came to grief financially, 1907, but seems to have im- l its financial position during 1908.

NOLDS MINE. **VERMONT.**

Iine office: South Strafford, Orange Co., Vt. J. B. Reynolds, manager rincipal owner. Lands, 900 acres, held under deed of mining rights, near lizabeth mine, 13 miles from Boston & Maine railroad, showing gneiss, schists and hornblende-schists, carrying lenticular ore bodies in series rming to dip of the country rocks, under garnetiferous mica-schist and hornblende-schist, with strike of West of North, and average dip of 45°. One ore body, of 40′ extreme width, not mineralized for full width, able circa 4,000′ on the property, shows chalcopyrite disseminated in otite, giving average assays above 3% copper. Development is by a 110′ e shaft, with about 70′ of workings on the 100′ level.

Equipment includes steam and air power, with a 3-drill compressor and al mine buildings.

INBACH COPPER MINES, LTD. **GERMANY.**

)ffice: 5 Copthall Bldgs., London, E. C., Eng. Mine office: Rheinbach Bruhl-Unkel, Rheinprovinz, Germany. Oliver Wethered, chairman; A. manager; C. Acton Dodds, secretary. Organized May 11, 1907, under of Great Britain, with capitalization £150,000, shares £1 par; issued, 07. Lands, 437 hectares, showing copper, lead and zinc sulphides, opened hafts.

OSTERKOP COPPER SYNDICATE. **CAPE COLONY.**

Iine office: Kakamas, Kenhardt district, Cape Colony. Capitalization 0. Lands, 19,000 morgen, area circa 40,000 acres, known as the Farm sterkop, on the southern bank of Orange river, circa 72 miles west of wn of Kenhardt, held under 17 months option. Property shows copper between gneiss and schist, with northeasterly and southwesterly strike. pal vein, with vertical dip, opened to shallow depth only, is 3″ wide at rface, gradually increasing to 4″, carrying high grade carbonates, oxides halcocite. The veins, as developed, are trivial in width, but are rich)parently worthy of further tests.

E ISLAND COPPER CO. **MICHIGAN.**

fice: 1000-32 Broadway, New York, N. Y. Mine office: Hancock, Hough- , Mich. Employs 25 men. Chas. J. Devereaux, president; Wm. R. Todd, ry and treasurer; preceding officers, Stephen R. Dow, Chester L. Dane, awton, Isaac H. Meserve and Jas. S. Dunstan, directors; M. H. Dennis, tendent. Organized 1898, under laws of Michigan, with capitalization 00, shares $25 par; paid in, $10. Last assessment was $1, due Jan. 7. Statement, as of date Jan. 1, 1908, showed cash on hand, $58,216.51, tal quick assets of $63,672.89, and total accounts payable of $2,717.43.

Lands, 800 acres, north of the Franklin Junior, on which extensive d mond drill borings have been made, giving drill cores from the Mesn epidote, Kearsarge amygdaloid, Allouez conglomerate, Pewabic amygdal and other copper-bearing beds.

No. 1 shaft, 275′ north of the Franklin Junior boundary, is 8x18′ in si with 3 compartments, 500′ deep, sunk on the Pewabic amygdaloid, which 8′ to 10′ wide, with 2′ to 3′ near the hanging-wall well mineralized, at point This shaft, abandoned 1902, is filled with water, to the first level, on wh it connects with No. 2.

No. 2 shaft, 1,200′ north of No. 1, also is 8x18′ in size, and is circa 1,3 deep, at the 10th level. This shaft has east and west crosscuts, and a crosscut driven 180′ east, encountered the Allouez conglomerate, March, 1903, but work thereon was discontinued, July, 1904, owing to poor showing secured. The ea crosscut, on the 8th level, at depth of 1,000′, cut 2 apparently valueless amyg daloidal beds, one being the Mesnard epidote lode. The East lode, about 7′ wide, carries a little copper, but nothing especially encouraging. The Wes lode, 96′ from the shaft, is 7′ to 9′ wide, carrying occasional bunchy copper. The 4 amygdaloidal beds lying between the West lode and the Allouez conglomerate have been tested by north and south drifts, 3 proving barren. On the 9th level a 6′ vein shows about 35′ of good copper ground, but the showing on the level below is poor. The south drift on the Pewabic lode, on the 8th level, is said to develop a good stretch of copper ground, in a 600′ drift toward the Franklin Junior. The Pewabic lode was explored, 1906-1908, by drifts on various levels, a 1,400′ drift on the 8th level north showing occasional 25′ to 75′ stretches of payable ground. No. 2 has a frame shafthouse, and a Nordberg hoist capable of raising 2-ton skips from a quarter-mile depth.

No. 3 shaft, 1,800′ north of No. 2, was started May, 1905, but work was discontinued at slight depth, and attention turned to diamond drilling, to locate the Kearsarge bed. The first cores from the Kearsarge lode showed copper, in somewhat encouraging quantities, from a bed of circa 19′ width.

Surface improvements include a 30x60′ machine and blacksmith shop, a 30x50′ frame warehouse and 15 dwellings. No. 2 engine-house has a 12-drill Rand air-compressor.

It is possible that the Rhode Island may be absorbed by the Franklin, as negotiations to that end were under way, late 1908. The Rhode Island has given very discouraging results, for 10 years of conscientious effort.

RHODESIA COPPER CO., LTD. RHODESIA.

Office: Salisbury House, London, E. C., Eng. Mine office: Bulawayo, Rhodesia. Lord Gifford, chairman; Bechuanaland Exploration Co., Ltd., manager in South Africa; F. White and Percy Tarbutt & Co., consulting engineers; Tom Donald, secretary. Organized Jan. 31, 1902, under laws of Great Britain with capitalization £750,000, shares £1 par. Company has floated the Rhodesian Broken Hill mine, a zinc and lead property, and paid a 10% dividend to shareholders, 1905, in the stock of that corporation.

Lands, 640 square miles, and the right to locate 8,000 mining claims and 24 farms, in northern Rhodesia, of which 5,665 mining claims and 24 farms have been located, at last accounts. The company has a close working alliance with the Northern Copper (B. S. A.) Co., Ltd., and apparently both companies have some sort of interest in the Bwana M'Kubwa and Hippo mines, which are described under title of Northern company. The Kitakata mine, one-half mile northeast of the Broken Hill property, shows stains and hand-specimens of oxide and carbonate copper ores.

JUAN DE C. RIBILLO. CHILE.

Mine office: Carrizalillo, Chañaral, Antofagasta, Chile. Property is t

esito mine, which, 1903, produced 850 metric tons of ore averaging 15% per, equivalent to about 275,000 lbs. fine copper.

CHARD III DEVELOPMENT CO., LTD. **BRITISH COLUMBIA.**

Office: Duncans, B. C. Mine office: Mt. Sicker, Vancouver Island, B. C. nds, east of the Tyee are opened by a 510′ two-compartment shaft, with 8′ of workings on 5 levels, having ore on each level, with considerable ore good average tenor in sight. Best ore is on the bottom level, a sample ton nitet giving returns of 3.29% copper, 25.85 oz. silver and 0.66 oz. gold per n. Has shipped considerable ore to the Tyee smelter, and paid, 1907, a % dividend.

CHFIELD COPPER CO. **MEXICO.**

Office: 1410 H St., Washington, D. C. Mine office: Querobabí, Ures, nora, Mex. Dr. S. T. Haffner, president; Maj. Jas. A. Cooper, vice-president; lbys L. Fickes, secretary and treasurer; Stewart Ellis, general manager; John sson, superintendent. Organized 1908, as successor of Richfield Mining Co., ich was organized May, 1901, under laws of Arizona, with capitalization 000,000, shares $2 par. Old company had a $100,000 bond issue, at 6%.

Lands, 382 pertenencias, area 955 acres, in 2 groups, including the Dos ciones group, 12 miles east of Tuape, down the San Miguel river, and 35 es from a railroad. Also has 26,512 acres of timber lands, in the Ures dis- t. The Dos Naciones group, having traces of antigua workings, is said to w 7 contact veins, between granite and limestone, of 16′ to 40′ estimated rage width, opened by shafts of 73′ and 75′, and by tunnels of 48′ and 60′, wing oxidized ores and chalcopyrite assaying 3% copper and 20 to 60 oz. er per ton, with small gold values. Is said to have a body of high grade at depth of 350′. Has a 120-h. p. steam plant, with two 20-h. p. hoists and -drill air compressor, and several mine buildings. Camp was raided by qui Indians, 1907, whereupon the Mexican workmen left, and mine was sed down.

CHFIELD MINING CO. **MEXICO.**

Dead. Succeeded, 1908, by Richfield Copper Co. Formerly at Querobabí, es, Sonora, Mex. Described Vol. VI.

CHMOND-EUREKA MINING CO. **NEVADA.**

Office: 1114-25 Broad St., New York, N. Y. Mine office: Eureka, Eureka , Nev. Albert Fries, president; W. H. Coolidge, vice-president; A. J. Selig- n, treasurer; A. F. Holden, managing director; A. P. Mayberry, mine super- ndent. Organized October, 1905, under laws of Maine, with capitalization 00,000, shares $10 par, as a merger of Richmond Mining Co. and Eureka nsolidated Mining Co., which were in litigation, thus reconciling the con- ting interests. The Richmond Mining Co. paid dividends of about $5,000,000, m 465,297 tons of ore produced. The Unted States Smelting, Refining & ning Co. owns circa 35% of the capital stock authorized, which is about % of outstanding stock, and names one of the 3 members of the voting st.

Lands are said to be circa 700 claims, including the old Richmond and reka mines, contiguous properties, opened circa 1869, which were large ore ducers, but were tied up by litigation for some years, until formation of sent company, during which time mines were idle, except for extensive amming, done by tributors. Under former ownership mines were highly ductive and profitable. Ore values are mainly in silver and lead. The reka mine is opened by the 900′ Locan shaft and the Econ incline, with velopment mainly below the 900′ level. The Richmond mine is developed ncipally through the Lizette tunnel, the old bonanza ore bodies apparently continuing below the 600′ level. Ore bodies developed, while low in grade, sibly may turn into higher grade ore. Equipment includes a good mining

plant and an antiquated smelter, at Eureka, 3 miles from the mines, wh been idle for some years. Company has secured the very reasonable rate of $2.75 per ton to Salt Lake smelters, for ore averaging less th per ton in gross values, and, early 1908, was shipping circa 200 tons Property considered valuable and management good.

RICHMOND GROUP GOLD MINES CO. NEW M

Dead. Formerly at Hillsboro, Sierra Co., N. M.

RICHMOND MINE. MON

Mine office: Saltese, Missoula Co., Mont. Chas. J. Heidenreich, m Lands, 6 claims, southwest of Saltese, adjoining the Monitor mine, ope 4 shafts, deepest 275', on a vein parallel to the Monitor, showing fr occurrences of native copper, and auriferous copper ores of good averag values. The property has been a small producer for some years, and to have been worked at a profit.

RICHMOND MINING CO. NE

Dead. Merged, October, 1905, in Richmond-Eureka Mining Co. Fo at Eureka, Eureka Co., Nev.

RICKARD-ELY COPPER CO. NE

Letter returned unclaimed from former office, 20 Broad St., New N. Y. Mine office: Ely, White Pine Co., Nev. G. L. Rickard, pre Webster Bishop, vice-president; Jos. H. Hutchinson, second vice-pre W. A. B. Ogden, secretary; Herbert T. Cook, treasurer. Organized circa ary, 1907, under laws of Arizona, with capitalization $1,000,000, shares Lands, 5 claims, adjoining the Veteran-Ely on the west, slightly pros 1907, by churn drilling. Idle at last accounts.

RIDGE COPPER CO. MICH

Office: 1105-6 Beacon St., Boston, Mass. Mine office: Mass, Ont Co., Mich. Organized October, 1863, under laws of Michigan, with cap tion $500,000, shares $25 par. Has levied assessments of $470,000, an dividends of $100,000. Practically entire stock issue is owned by Ma solidated Mining Co., and it is planned to wind up the corporation and t its landed holdings to the Mass.

CARLOS RIESCO.

Office and works: Tiltil, Santiago, Chile. Property is the Tiltil having railroad connection. Works have two 55-h. p. boilers and three engines, with Blake crusher and two Connersville blowers. Smelter ha cining furnace and 2 water-jacket blast-furnaces. Fuel is Chilean coke, 35.5 pesos, and coal, costing 22.3 pesos, per metric ton. Slags averag 0.5% copper. Employs about 35 men, at average wages of 1.8 pesos da 1903 treated 4,850 metric tons of ore averaging 6.5% copper, produc metric tons of ejes, of about 45% average tenor, containing circa 650 fine copper.

RIGBY MINING & REDUCTION CO. AR

Office: Beaver Falls, Pa. Works office: Mayer, Yavapai Co Col. T. Johns Rigby, president and general manager; F. H. Walker, s and treasurer; preceding officers, R. D. Mead, L. S. Neely and Edward directors; A. W. Hudson, manager; Harry A. Clarke, superintendent.

Property is a custom smelting plant, on a 70-acre site, near May nected by a 3,000' spur with the Prescott & Eastern Railway.

This company holds the Yavapai county rights to the Poehle & C volatilization process, and has a 125-ton reduction plant, blown in, Apr The process of reduction is as follows: from the receiving bins, ore in tram-cars to 2 revolving dryers, one of 40" diameter by 18' length other of 60" diameter by 26' length, heated ore passing from them, by to cars, which take it to the feed-hoppers in the roll-house, latter h

of 30x14" rolls and 1 set of 20x12" rolls, with screens and elevators. Dust rolls is collected by 3 large dust-collectors. Crushed ore is taken from the ns to a 40-ton ore-bin in the mixing house, by an 84' automatic belt-con-r. In the mixing-house, ore and salt from the salt-bins are weighed by 2 of hopper scales, and deposited on a 50' belt-conveyor, which takes the rial to a box-mixer, whence the mixed charge is dumped into a car which s it to 4 feed-hoppers, which feed the charges automatically to revolving aces, in a furnace building 88x132' and 40' high, having four 25-ton re-ing calcining furnaces. Fumes from the ore are drawn from the furnaces ugh the flue-house, which contains 4 sets of 3' wrought-iron pipe, each long, into the condensing house, by 4 large blowers, each capable of lling 6,600 cubic feet of gas per minute. Fumes are cooled by water, in flue-chamber, then forced under pressure into the condensing room, where osited as chlorides, condensing-room fumes going to the filtration room, re all insoluble matter is filtered, and where metallic values are precipi-d, either by electric action, or on iron. Precipitates are melted and re-d in the ordinary manner. The residue of the roasted ore, from which the allic values are supposed to have been volatilized, is carried to the tailings p, in tram-cars. The theory of the process is that the application of heat the mixture of ore, salt and sulphur, causes a chemical reaction, by which sulphur and sodium chloride form sulphate of soda, the chlorine from the uniting with the metals to form chlorides, which pass off in the fumes, l are recovered in the manner previously explained.

The company has made several smelter tests in the past few years, all nounced satisfactory by the management, but apparently has secured no ular production, and the success of the process seems doubtful.

LLITO MINING CO. **ARIZONA.**

Letter returned unclaimed from former mine office, Tucson, Pima Co., Ariz. e and apparently moribund.

NCON MINES CO. **ARIZONA.**

Office: North American Bldg., Philadelphia, Pa. Mine office: Congress uction, Yavapai Co., Ariz. W. C. De Armond, president; S. S. White, vice-sident; Edw. P. Vogel, secretary and treasurer. Organized January, 1904, ler laws of Arizona, with capitalization $1,200,000, shares $1 par, in $200,000 mulative 7% preferred stock and $1,000,000 common stock. Lands, 31 claims, a 570 acres, in the Weaver district, showing auriferous and argentiferous per and lead sulphides.

NCON MINING CO. **ARIZONA.**

Office: care of B. J. O'Reilly, secretary, Bisbee, Ariz. Mine office: [illegible], Cochise Co., Ariz. Organized under laws of Arizona, with capitalization 500,000, shares $25 par. Lands, 27 claims, 22 miles north of Benson, de-oped by a 130' tunnel, showing ore giving assays up to 23% copper. Pro-ably idle.

NGING ROCKS COPPER MINING CO. **PENNSYLVANIA.**

Mine office: Pottstown, Montgomery Co., Pa. Idle several years.

NG VALLEY MINING CO., LTD. **TASMANIA.**

Office: Finsbury House, London, E. C., Eng. Mine office: [illegible] adas Co., Tasmania. H. T. Walker, chairman; H. St. John [illegible] y; Geo. Barker, mine manager. Organized July 20, 1900, under at Britain, with capitalization £125,000, shares 10s. par. Lease hold, on the Ring river. Is a small shipper of argentiferous ploying about 10 men.

O ARRIBA CONSOLIDATED MINES CO.

Dead. Formerly at Tres Piedras, Taos Co., N. M.

RIO BACANUCHI MINING CO. ME

Letter returned unclaimed from former mine office, Bacanochi, A Sonora, Mex. Property shows cupriferous copper and silver-lead ores. S ore shipments were made, 1907.

RIO BLANCO SMELTER. P

Owned by Peruvian Mining, Smelting & Refining Co.

COMPAÑIA MINERA RIO COLORADO. CH

Office: Santiago de Chile. Mine office: Victoria, Santiago, Chile. O ized Dec. 12, 1906, under laws of Chile, with capitalization 300,000 pesos, s 20 pesos par.

RIO DOLORES COPPER CO. U

Office: 731 East 18th Ave., Denver, Colo. Mine office: Castleton, Co., Utah. Employs circa 10 men. C. L. Dyer, president; Victor Elliott, president; Col. Thos. B. Crawford, secretary, treasurer and general man Wm. Eastman, superintendent. Organized Feb. 8, 1906, under laws of Ar with capitalization $2,000,000, shares $1 par. Annual meeting, first Thu in July.

Lands, 15 claims, area 300 acres, also 100 acres in millsites, on M Mountain, at the head of Castle Creek, 6 miles above Castleton, in the L district, showing mainly granite, with porphyritic intrusions, said to car ore bodies, of which 2 are slightly developed by tunnels, a 250' tunnel said to show a 3' vein of high grade auriferous and argentiferous coppe estimated to average 2 to 3% copper, 10 oz. silver and $3 gold per ton. are mainly lead and copper sulphides. Equipment includes a 5-drill ai pressor and 6 log buildings. The company was promoted by Fred G. Sl whose reputation is bad, but Col. Crawford, now in charge, is said to experienced mining man.

RIO DOLORES MINING CO. COLOR

Office: care of W. K. Cowan, treasurer, Chicago, Ills. Mine office: Dolores Co., Colo. Lands, 2 miles north of Rico, are said to show a 3' carrying up to 8% copper.

SOCIÉTÉ DES MINES DE CUIVRE ET DE PLOMB DE RIO FARDIS. SP

Mine office: Molinillo, Ciudad Real, Spain. Organized August, under laws of France, with capitalization 2,500,000 francs, shares 250 f. p develop argentiferous lead and copper properties, near Molinillo. Idle.

COMPAÑIA MINERA RIO GRANDE y DOLORES DE LONDRES. ME

Office: 37 Old Jewry, London, E. C., Eng. Mine office: Guadalup Grande, Coahuila, Mex. A. T. MacSwinney, manager. Property is La mine, carrying argentiferous copper ore, with values mainly in silver. steam and water power, with a 20-ton mill and leaching plant, employing 75 men.

RIO GRIO DISTRICT COPPER CO. (TOBED & CODOS EXPLORATION), LTD. SP

Dead. Title changed, January, 1907, to Aragon Copper Mines, Ltd. merly at Codos, Zaragoza, Spain.

RIO HONDO COPPER CO. NEW ME

Dead. Property sold, circa 1900, to San Cristobal Copper Co. Fo at Arroyo Seco, Taos Co., N. M.

RIO LUNA MINES CO., LTD. SP

d. Formerly at Campo La Lomba, León, Spain. Described Vol.

É DES MINES DU RIO MURTIGA. SP

e: 34 Rue de Provence, Paris, France. Mine office: Encis Spain. Organized Jan. 7, 1904, under laws of France, with capit

00 francs, shares 250 francs par. Property is the Santo Domingo and abel mines. Presumably idle.

GRO MINES, LTD. **SPAIN.**

e: 6 Suffolk St., Pall Mall, London, S. W., Eng. Mine office: Campo ba, León, Spain. Alfred DuCros, chairman; W. T. Cunningham, secre- rganized Aug. 2, 1899, under laws of Great Britain, with capitalization , shares £1; issued, £235,007. Debentures, £15,000 authorized; £14,000 Lands, 8 claims. Idle several years and apparently moribund.

MAL COPPER CO., LTD. **SPAIN.**

d. Wound up August, 1905. Formerly at Figueras, Gerona, Spain. d Vol. VI.

MBO DEVELOPMENT SYNDICATE, LTD. **PERU.**

e: 4 Broad Street Place, London, E. C., Eng. Mine office: Arequipa, Capt. W. B. McTaggart, J. P., chairman; E. J. Summers, secretary; V. Hopkins, manager. Organized Aug. 26, 1905, under laws of Great with capitalization £15,025, in 15,000 shares of £1 par and 500 founders f 1s. par. Property is gold and copper claims near Arequipa.

NIDO COPPER MINES, LTD. **SPAIN.**

d. Voluntarily liquidated, April, 1903. Formerly in Huelva, Spain.

DE COBRE DE RIO TINTO. **MEXICO.**

d. Was succeeded, 1907, by Rio Tinto Mines & Smelting Co. Formerly zas, Chihuahua, Mex. Fully described Vol. VI.

ÑIA MINERA RIO TINTO. **MEXICO.**

e office: Guadalupe, Zacatecas, Mex. Property is said to carry gold, id copper ores.

NTO CO., LTD. **SPAIN.**

e: 30 St. Swithin's Lane, London, E. C., Eng. Mine office: Las e Rio Tinto, Huelva, Spain. Works office: Port Talbot, Glamorgan- ales. Employs circa 11,000 men. Chas. Wm. Fielding, chairman; pre- fficer, Rt. Hon. Earl of Denbigh, Lionel C. G. Sartoris, John MacFarlan n M. Macdonald, directors; J. Gordon Macleod, general secretary; J. Bowes, financial secretary; Turquand, Youngs & Co., auditors; Com- Bank of Scotland, Ltd., bankers; Freshfields, solicitors; Walter J. g, mine manager; R. E. Palmer, assistant manager; W. G. Nash, estates ; G. W. Porteous, traffic manager; Geo. Davey, superintendent; Gordon , engineer; D. Gonzalo Tarin, consulting engineer.

anized March 29, 1873, under laws of Great Britain, with capitaliza- 250,000, increased, November, 1905, to £3,500,000, shares £5 par, in 00 cumulative 5% preference shares and £1,875,000 ordinary shares. e issue of 50,000 ordinary shares, par £5, was sold to shareholders at share, netting the company £3,150,000, for the redemption of an out- bond issue of £2,989,740, at 4%, which was fully retired. Transfer ommon; fee, 2s. 6d.; warrants to bearer issued in denominations of fee 6d., and 5, 10 and 25 shares, fee 1s.; fee for conversion into regis- iares, 2s. 6d. per certificate. Stock Exchange settlement, all shares n the official list. Fiscal year ends with calendar year; accounts are n April, and an interim semi-yearly report is issued in October. Divi- re payable in Paris by the Société Générale, 54 Rue de Provence, and en, Germany, by the Deutsche Bank.

idends were begun 1879, and have been paid continuously, varying according to net earnings. Dividends on the old ordinary shares, of 1879, to 1896, ranged from 6s. in 1886 to 38s. in 1896. On the present shares of £5 par, dividends have ranged from 40% in 1897 to 110% Dividends were small at first, because the company was seriously pped by three different sets of mortgage bonds, bearing 5% interest.

In 1895 the mortgage debt was consolidated into a single issue of £3,
first-mortgage debentures, bearing 4% interest, with a sinking fund an
annual redemption, which would have extinguished the mortgage in 191
by the issue of new share capital, November, 1905, floated at the trem
premium of 1,160%, the company has placed itself in an impregnable fi
position, the credit for this able stroke of finance being due mainly
Fielding. Recent dividends on ordinary shares have been as follows: £3 1
or 72½%, for 1901; £2 10s., or 50%, for 1902; £3 10s., or 70%, for 1903;
or 70%, for 1904; £4, or 80%, for 1905; £5 10s., or 110% for 1906; £2
or 47½%, for 1907.

Gross profits and dividends paid for recent years have been as f
£1,691,723 profits and £1,214,687 dividends in 1903; £1,714,507 profi
£1,214,772 dividends in 1904; £1,900,539 profits and £1,477,187 divide
1905; £2,478,594 profits and £2,139,687 dividends in 1906; £2,139,688 di
in 1907. The company ended 1908 with a reserve fund of £500,000, of
£400,000 was in consols and £100,000 in selected shares. The company'
dends in 1907 were the greatest ever paid in one year by any copper mi

Lands, 23,000 acres, freehold, of which 1,922 hectares, or circa 4,70
were secured from the Spanish government, and 18,300 acres adjoinin
purchased from various private owners. Mining operations are condu
an area of practically 5 square miles.

The Rio Tinto is much the most ancient of the great mines of the
day, and its history stretches back into the mists of antiquity. T
semi-authentic account of the mine dates from the Eleventh Century
Christ, when the Phœnicians traded in copper made from its ores. C
that vigorous young offspring of Tyre, succeeded to the hegemony
Iberian mines, and worked the Rio Tinto extensively, for several c
being displaced, in turn, by the Romans, after the repulse of the secon
invasion, followed by the total overthrow of the Carthaginian powe
Rio Tinto was worked by the Romans, for centuries, upon a very cons
scale, and, after the decadence of the Roman power, the mines were o
in a very crude way, by the Goths. Again the fortunes of war gave the
peninsula to new masters, and the Moors, in turn, were owners and o
of this great copper deposit. Following the expulsion of the Moo
southern Spain, by Ferdinand and Isabella, those most Catholic and m
like sovereigns of Castile and Aragon, the mines fell into the hand
Spaniards, and were reopened by them, very early in the Sixteenth
The Spaniards, while among the world's best miners, and the pio
silver and gold mining in both North and South America, never pa
attention to copper or iron, and, even at home, the Rio Tinto, alth
property of the Spanish Crown, was worked, during its most successful
by foreigners, as it is to this day. In the Seventeenth Century the
came a considerable producer, under the management of a Swed
Wolters, and after his death did fairly well under the direction of
metallurgist named Tiquet. In the Eighteenth Century the mine wa
by the crown to a company of English adventurers, of whom the leadi
was Lady Maria Theresa Herbert. During the chaotic period of the
invasion, early in the Nineteenth Century, the mine was abandoned, a
being reopened, in 1812, by the Spanish Crown, was worked in a sm
only. For the next sixty years the mine was under the management of
lessees, until sold outright, in 1873, to Matheson & Co., of Lon
92,800,000 pesetas, that firm organizing the present company, which ha
one of the most profitable mining corporations in existence.

The remains of mining and smelting operations of the ancients
notable. Don Gonzalo Tarin, consulting engineer of the company,

closely connected with the mine since 1867, in his very able work, norias,'' estimates the quantity of scoria remaining from ancient smelt- perations, whether Roman or Phœnician, or both, at no less than thirty n metric tons, and his acquaintance with the property and its history, his opportunities of estimating and verifying these figures, are perhaps est of any individual living. Lying above slag-piles left by the Phœnic- is a 10′ bed of alluvium, on top of which are the Carthago-Roman slags. smelting practice of the Romans apparently was very good, the slags left hem being as clean as those produced today. It is possible, however, that of the copper left in the old slags has been leached out, during some years of partial exposure to the elements, but it is the opinion of Señor n that the slags have been resmelted, in which case the very latest modern llurgical practice is but a repetition of the work of two thousand s ago.

The only remains of ancient mining tools and machinery that have been d at the Rio Tinto are three oak water-wheels, and some bronze rims of les, which presumably were of wickerwork. There also are many pot- ds, including fragments of miners' lamps of the well-known classic pattern, Roman coins are unearthed occasionally.

The Roman system of mining, so far as can be judged from the evidence ed by the Rio Tinto mine, apparently was to cut narrow seams and slab he ore in large masses, either by wedging, or by the agency of quicklime, ed into the crevices and then wetted, and possibly both methods were used, being the systems most generally employed, previous to the adoption of owder for blasting. The richer veins were followed persistently, and the nts were good judges of values, as has been learned by many a modern ng company that has reopened old mines in Spain and Italy, in the hope nding that much high-grade ore was left unmined. The Rio Tinto was not ed out, because the deposit was too vast, but the rich ores of the secondary of enrichment were quite effectually extracted, in all the old workings. cations favor the hypothesis that the ancient miners at the Rio Tinto used -faced tools and hand-drills, working directly on the faces and in the ore es.

The Rio Tinto is situated in a rugged district, in a spur of the Sierra evallo, though the hills sometimes are held to be a spur of the Sierra ena, which itself is a branch of the famous Sierra Morena. The Rio , however, is separated from the Sierra Andevallo, which is some 12 miles nt, by the rivers Odiel and Iárrama. The mines are 51 miles by rail from seaport of Huelva, in the province of that name, lying in the extreme westernmost corner of Spain, near the Portuguese boundary.

The ore bodies of the Rio Tinto occur in mammoth lenses, with clay-slate e south and porphyry to the north, and are surmounted by large gossans, decomposed. The surface ore has been leached to the point of absolute hlessness, the zone of secondary enrichment beginning at a depth of oximately 100′, and continuing to an average depth of 300′. Diamond borings have shown untouched ore bodies carrying upwards of 130,000,000 tons of ore, giving sufficient reserves for nearly 70 years' production, at present rate of mining, and it is unlikely that the full extent of the ore es available has been proven. For removal of overburden there are 4 m-shovels, each with dippers of 4 cubic yards capacity, and about 2,000,000 meters of overburden are removed yearly.

Ore, as extracted, is divided into 3 classes. Smelting ore carries 4 to 6% er, export ore about 3.5% copper and 45 to 50% sulphur, while leaching carries 1.5 to 2% copper only. The average percentage of copper carried he ores treated has ranged from 1.5% copper, in 1876, the first year of

production by the present company, to 3.234% in 1884, the average of copper extraction being 2.39% in 1903, 2.34% in 1905 and 2.411% in 1906, in which year the lower grades of ore averaged copper returns of 2.302% and 1.198%. The ores carry an average of 1.5 oz. silver per long ton, with traces of gold, and considerable silver is saved, by the Claudet process, at the smelter. About one-third of the total production is exported for sulphur contents, and about one-third of the ore produced is smelted, balance being leached, or sent abroad to burners. The ores average 4 to 5% copper in the zone of secondary enrichment, and with depth decline gradually in value, until at about 1,000′ depth the average copper tenor is only about 1.25%. The main ore body formerly was considered to carry chalcopyrite, sparingly disseminated in massive iron pyrites, but apparently the bulk of the ore is cupriferous pyrite, carrying copper in the form of fine grains of chalcocite, not chalcopyrite, as formerly generally held. Owing to the ore being unusually rich in sulphur, the shipping ores of the Rio Tinto are in good demand, and, in addition to supplying various British works, the company exports washed sulphur ore, in very large quantities, to Germany, France, Belgium and sundry seaboard acid works in the United States. The reserve heaps at the mine are estimated to carry about 150,000 long tons fine copper, and the copper output of the mine has shown little change since 1898.

The Rio Tinto has 3 mineral zones, carrying a succession of lenses, these being known as the South or Nerva lode, the Middle or San Dionisio lode and the North lode, in addition to which there are 2 smaller detached lenses, adjacent to the North lode, which, like it, are being worked open-cast. There are 5 different mines, of which 3 are worked open-cast and 2 underground, though one of the latter is being changed over for open-cast extraction. The underground mines are worked pillar-and-stall, with levels at intervals of 12½ meters, levels being opened 4 meters high, and the entire floor divided into galleries and crosscuts of 4x4 meters, leaving pillars of 6x6 meters, which is not an entirely satisfactory method of extraction, leaving, as it does, more ore in the pillars than is mined.

The San Dionisio mine, which is the westernmost, also is the deepest, having a shaft of nearly 1,200′ depth. Work was begun, 1907, in changing over the San Dionisio for open-cast extraction, and open pit production probably will begin 1911. The San Dionisio is likely to afford the chief source of ore supply for several decades to come, and the management has laid out work for 10 years in advance.

The principal workings of the Rio Tinto are open-cast, and in these the capping is sliced down, in terraces, and the ore mined in terraces also, cars being brought in by locomotives to as great depths as practicable, both in stripping and quarrying. The possibility of using the caving system for underground mining was considered, but apparently an adverse decision has been reached. The principal disadvantage of underground mining, beyond the loss of more than half of the ground left unmined in the pillars, is the scarcity and high price of wood for timbering, which could be obviated, largely, by the adoption of the caving system.

Some trouble was caused, early 1908, by subsidance of the ground over the South lode mine, this causing the collapse of a considerable number of buildings. This subsidance was not unexpected, though coming somewhat sooner than anticipated, and the buildings lost will be replaced at other points.

Owing to the extensive employment of open-cast extraction, the Rio Tinto lacks the immense hoists and powerful machinery found at the other great copper mines of the world, which is due, not to lack of enterprise, but to the mine's ability to dispense with such expensive machinery, the underground workings being neither especially deep nor extensive. The company erected,

1908, a large central electric power plant, to replace a number of widely scattered and uneconomical steam installations.

The methods of lixiviation followed by the Rio Tinto are described at length in the chapter on hydrometallurgy in this volume. In addition to the amount of copper estimated in the teleras, or primary leach-heaps, there are upwards of 100,000 long tons of copper in the tereros, or secondary leach-heaps. Owing to alternations of heavy rainfalls with protracted seasons of drought, water storage is necessary, dams having been constructed for that purpose, and an additional reservoir was built, 1907. The average rainfall of the Sierra Morena, 1873-1905, was 28" yearly, but, in 1906, the precipitation was only 18", causing serious trouble, during 1907, from lack of water, heavy rainfalls at the end of 1907 giving an ample supply for 1908 operations. The ore leached at the mines is no longer calcined, the copper becoming soluable by natural weathering, assisted by systematic sprinkling. About 7,000,000 gallons of leach-water, strongly charged with copper, are treated daily, in the various lixiviation plants of the Rio Tinto. The product of the leaching plants is cascara, or cement copper.

There are 5 towns for workmen on the property, and the company has planned an unusually heavy building campaign for 1909, as a large number of dwellings must be constructed, to replace those destroyed, early 1908, by subsidance of the workings of the South lode.

The smelter, at the mine, built 1902, is treating an increasingly large proportion of ore on the ground, including considerable ore of a grade formerly leached. The smelter has two 42x160" elliptical water-jacket cupolas, 23' 4" over all in height, with charging doors 10' above the bottoms, which are detachable, and mounted on wheels. Each furnace has 8 water-jackets and 2 charging doors, ore and fuel being charged alternately. The furnaces have continuous discharge into 30-ton settlers, 12' in diameter and 40" high, which have continuous slag discharge. Furnace product is matte, of 29 to 34% copper tenor.

Molten matte is taken, in 8-ton ladles, by electric traveling cranes, to the converter department, where there are 6 stands, rotated hydraulically, from a pulpit. Shells are 80x120", of horizontal barrel type, with spherical valves and 12 tuyeres each, and are in 2 parts, for convenience in lining. Shells are double-lined with a 4" external course of fire-brick, rarely replaced, and an inner section, 22" to 26" thick, of ground silica and low-grade quartzose copper ores, with 10% of clay for a binder. When newly lined shells have a capacity of only 3 to 4 tons each, increasing to about 8 tons when the inner linings are nearly burned out. The smelter product is converter bars, of 98 to 99% copper tenor.

The mines are connected with the seaport of Huelva by the Rio Tinto-Huelva railway, a single-gauge line of 84 kilometers length, built, 1873, by the company. This line does a general freight and passenger business, in addition to handling the company's heavy traffic, and earns substantial net profits. At Huelva, which probably is built on the site of the old Phœnician city of Onoba, at the junction of the Tinto and Odiel rivers, known to the Phœnicians and Carthaginians as the Urium and Anas rivers, the company has extensive railway terminals and wharves. The Rio Tinto company owns the steamer Don Hugo, of 1,249 tons registered burden, plying between Spain and Wales.

The Rio Tinto employs nearly 11,000 men, in Spain, of which number about 60 members of the staff are British, the balance being native workmen, latter earning average wages of 15 reals, equal to about 60 cents, per day of 8 and 9 hours. There is no Sunday work, and the men are paid daily, the labor being docile and giving very efficient and satisfactory workmen, in all grades. The population of the dual mining township of Rio Tinto-Nerva is

about 27,000, and of the port of Huelva 24,000, hence it is estimated that th Rio Tinto Co., Ltd., is the direct source of support of 50,000 people in Spai and indirectly supports perhaps half as many more in Spain, England and upo the Continent.

For many years the company maintained extensive smelters and aci works at Cwm Avon, Wales, but the lease was surrendered, 1906, the work being poorly located for receipt and dispatch of material.

The new Welsh reduction plant, at Port Talbot, Glamorganshire, Wale is a modern smelter of good design and equipment, receiving material by se from Spain, and having direct rail connection with the Great Western Rail way. Electric power is used throughout, and there are 2 Temperley trans porters, operated electrically, for carrying bags of precipitate and bars into the ore-sheds. The Port Talbot works have five 30-ton refining furnaces, tap charged by cars operated electrically, and the reverberatory furnaces have side-slag discharge. Slags from the reverberatories, carrying 4 to 6% copper are resmelted in a water-jacket blast-furnace. The works have mechanical ladleing, with traveling carriages running on rails, the carriages having ball bearings, with metal weights on the handles to counterbalance the charges. The cinder from the acid plant is treated by the Henderson wet process, for the extraction of copper.

Production of copper, for the past 5 years, has been as follows: 80,214,400 lbs. fine copper in 1904; 72,307,200 lbs. in 1905; 75,379,520 lbs. in 1906; 72,390,080 lbs. in 1907. Ore production has been as follows: 1,918,538 long tons in 1903; 1,948,819 tons in 1904; 1,930,100 tons in 1905; 1,923,716 tons in 1906; 1,906,948 tons in 1907. Average cost of copper is about 7 cents per pound. About two-thirds of the ore extracted is treated locally and balance shipped, and copper production is approximately 60% from smelting ore and precipitate, and 40% secured from the residue of ore shipped for sulphur burning.

The management of the Rio Tinto happily combines British conservatism with Twentieth Century progress, and the mine itself, having been a producer for three thousand years, scarcely requires endorsement.

RIO TINTO COPPER MINING CO. WYOMING

Dead. Formerly at Encampment, Carbon Co., Wyo.

RIO TINTO COPPER SYNDICATE, LTD. TRANSVAAL

Dead. Liquidated August, 1908. Former office was Robinson's Bldg., Johannesburg, Transvaal. Capitalization was £6,000, shares £1 par, with working capital of £2,000. Property was the Farm Klipplaatdrift No. 52. Formerly in the Middelburg district, Transvaal.

RIO TINTO DEVELOPMENT CO. U. S. A.

Office: Majestic Bldg., Denver, Colo. W. W. Ellis, president; A. A. Marshall, secretary and treasurer. Organized January, 1908, under laws of Arizona, with capitalization $2,750,000, shares $1 par, in $250,000 cumulative 15% preferred stock and $2,500,000 common stock. Was formed to buy stocks in copper mining companies.

RIO TINTO GOLD & COPPER CO. ARIZONA

Dead. Formerly at Prescott, Yavapai Co., Ariz. Described Vol. VI.

RIO TINTO (HILLGROVE) COPPER MINES, N. L. AUSTRALIA

Office: Charters Towers, Queensland, Australia. Organized Aug. 3, 1907, with capitalization £8,000, shares 2s. 6d. par.

COMPAÑIA MINERA RIO TINTO MEXICANO. MEXICO

Office: Chihuahua, Mex. Mine office: Terrazas, Chihuahua, Mex. Employs 150 men. Juan A. Creel, president; Frank Fletcher, general manager; H. L. Schneider, superintendent.

Lands, 96 pertenencias, area circa 200 acres, including the Rio Tinto group

0 hectares, at Terrazas, 25 miles north of Chihuahua, on the Mexican Cen- Railroad, and the Savanarola group, at Savanarola, circa 50 miles south hihuahua and 35 miles west of Ortiz, latter carrying argentiferous copper lead ores.

The Rio Tinto Mexicano mine, opened 1860, closed 1902, and reopened a 1905, shows limestone and altered andesite, carrying 5 lenticular ore ies, traced 1,500 meters, in a metamorphic zone between limestone and ptive rocks, ore, mainly in limestone, occurring apparently as replacements, as lenses, between the bedding planes of limestone, near a large intrusive rtzite dyke. The ore bodies are erratic in size and occurrence, but are con- ted, and practically continuous, as a rule. The limestone has an average of 45° NW., carrying 5 ore bodies, of 5′ to 6′ average width. Ores, as de- oped, are mainly oxidized, and are estimated to average 2.5% copper, with ces of lead and zinc, 5 oz. silver and 0.02 oz. gold per ton.

Development is by the 412′ Verde shaft, 350′ Promontorio shaft, 150′ nce shaft, 120′ Pedernal shaft, 180′ San Martin shaft and 100′ Vinagre ft, with about one mile of workings.

Equipment includes a 50-h. p. gas plant at the mine, and a 100-h. p. steam nt at the smelter. There are 5 hoists, of 6 to 22 h. p., good for circa 500′ th. Buildings include various shops, of adobe, and 5 stone shafthouses, h 150 adobe dwellings for workmen.

The smelter, at Terrazas, one mile from the mine, receiving ore by wagon l rail, is reached by a 1-kilometer spur from the main line of the Mexican tral Railway. Water is secured from a pumping station, one mile distant, ough a 4″ pipeline. The smelter, enlarged 1908, which does a general cus- business, has a 200-ton water-jacket blast-furnace, making matte averag- 50% copper, 50 oz. silver and 0.6 oz. gold per ton, sent to the Aguascalientes rks for refining. The smelter is planned as the first unit of a 600-ton per and lead plant. Mine fuel is wood, costing 7 pesos per cord, and coal, ting 13 pesos per metric ton, and smelter fuel is coke, costing 19 pesos ton.

Production was circa 1,000,000 lbs. fine copper in 1906, circa 1,400,000 in 1907, and circa 1,500,000 lbs. in 1908. Ore treated, 1907, was 27,000 tric tons, averaging circa 2.5% copper, secured at a mining cost of 7 pesos ton, and smelted at a cost of about 7 pesos per ton, giving an average t for finished copper of 12.5 cents per ton.

The company plans deepening its shafts and opening new ore bodies, also ilding an addition to the smelter, material for which was on the ground, e 1908, and constructing a narrow-gauge railroad between the mines and elter. In August, 1908, the mine was producing circa 75 metric tons of ore ily, averaging 2.5 to 3% copper, 5 oz. silver and 0.02 oz. gold per ton. The ne, while low in average tenor, has very large ore bodies, with a favorable ation, and the management is considered good.

O TINTO MINES & SMELTING CO. **MEXICO.**

Mine office: Terrazas, Chihuahua, Mex. Martin J. Condon, president; hn M. A. Conner, general manager; W. C. Murray, superintendent. Organ- d 1907, under laws of Mexico, with capitalization 3,000,000 pesos, as suc- sor of Minas de Cobre de Rio Tinto. Property is described under title of mpañía Minera Rio Tinto Mexicano.

O TONTO COPPER CO. **ARIZONA.**

Letter returned unclaimed from former mine office, Wickenburg, Maricopa , Ariz. Lands, 15 claims, in the Picacho district, east of Wickenburg, said show gossans of 200′ to 300′ width, traceable up to 700′ in length, with ores rying 2 to 25% copper.

RIO VERDE COPPER CO.

Letter returned unclaimed from former office, Kansas City, M office: Baborigame, Mina, Chihuahua, Mex. Oliver Krull, manager. zation, $2,000,000. Lands are the San Carlos group, 20 miles from Ba and circa 50 miles from Choix, having 2 shafts, one showing a 2′ vein copper and lead sulphides, and the other a 2′ vein of copper sulphides 12 to 15% in tenor. Presumably idle.

RIO VISTA GOLD & COPPER MINING CO. CALIF

Office: 25 Nevada Blk., San Francisco, Cal. Mine office: Fair Dorado Co., Cal. L. H. Hand, president; R. M. Harris, secretary; J. ford, superintendent. Organized January, 1901, under laws of South with capitalization $1,000,000, shares $1 par.

Lands, 5 claims, 2 patented, area 100 acres, 3 miles from Fair Play, ing the Consumnes mine, area 40 acres, opened by a 400′ shaft, said to 23′ vein, carrying a 4′ paystreak of bornite giving average assays of cir copper and $10 combined gold and silver values. Mine has about 500′ nels, the Volcano tunnel being claimed to show a 10′ vein carrying Equipment is said to include a steel gallows-frame, hoist, and 3-drill compressor, using baby drills.

The company was said to be building a 30-ton smelter, but same to materialize, and the company disappeared from its former office. C is viewed with suspicion, on account of extremely untruthful advertisin early days, and the fact that it does not pay its bills.

RIPLE COPPER MINES, LTD. NO

Office: Finsbury House, Blomfield St., London, E. C., Eng. Or May 8, 1908, under laws of Great Britain, with capitalization £175,000, £1 par, to acquire mines in Norway.

RIP VAN WINKLE CONSOLIDATED GOLD MINING & MILLING CO. WY

Office: Laramie, Wyo. Mine office: Morgan, Carbon Co., Wyo. Swigart, secretary and treasurer.

RISING SUN COPPER MINING & SMELTING CO. MAR

Dead. Formerly at Mt. Washington, Baltimore Co., Md.

RITO ALTO COPPER CO. COL

Office: 102 Exchange St., Portland, Me. Mine office: Hillside, Co., Colo. H. M. Comstock, general manager. Capitalization $1,500,00 $1 par, half common and half 8% preferred shares. Lands, circa 3 Company claimed to have 3½ miles of underground workings, and to ing a 50-ton reduction plant, but neither statement verified nor co credible.

RIVERSIDE COPPER CO. AR

Dead. Formerly at Morristown, Maricopa Co., Ariz. Described

RIVERSIDE COPPER MINING CO., LTD.

Office: Wardner, Idaho. Letter returned unclaimed from form office, Cataldo, Kootenai Co., Idaho. Lands are about 10 miles from

ROARING FORK MINING & MILLING CO. WY

Dead. Formerly at Rambler, Carbon Co., Wyo.

ROBERTA MINING CO.

Letter returned unclaimed from former mine office, Mullan, Shosh Idaho. Thos. Roberts, manager. Lands, 12 claims, patented, well t one Nine Mile Creek, having several short tunnels, lower, of 100′, plann driven 2,000′, to give a back of 800′, to tap 4 parallel veins, 1 of whi surface ores assaying up to 6% copper, 10% lead, 16 oz. silver and per ton.

[redacted]

[redacted]

[redacted]

ROCKY MOUNTAIN CONCENTRATING & MILLING CO. COLORADO.

Mine office: Black Hawk, Gilpin Co., Colo. Ores carry gold, silver and copper. Has gasoline power, 25-stamp mill and 75-ton concentrator. Presumably idle.

ROCKY MOUNTAIN COPPER CO. WYOMING.

Dead. Formerly at Encampment, Carbon Co., Wyo. Described Vol. VI.

ROCKY MOUNTAIN SMELTING CO. COLORADO.

Dead. Property was the Rocky Mountain Smelter. Formerly at Florence, Frémont Co., Colo.

SOCIÉTÉ DES MINES DE CUIVRE DE RODAM. PORTUGAL.

Office: Brussels, Belgium. L. Maudet, R. Hoëd, E. Fournier, P. Steenlé and L. Mourgues, directors; Jacques François, commissaire. Organized Feb. 28, 1906, under laws of Belgium, with capitalization 1,000,000 francs, shares 200 francs par. Presumably idle.

RODMAN MINING & MILLING CO. NORTH CAROLINA.

Dead. Formerly at Guilford College, Guilford Co., N. C.

ROEBURNE COPPER & GOLD MINES, WESTERN AUSTRALIA, N. L. AUSTRALIA.

Office: Sydney, N. S. W., Australia. Mine office: Roebourne, Western Australia. Organized circa January, 1907, with capitalization £40,000, shares 10s. par. Lands are the Carlow Castle group, leasehold, carrying 2 ore bodies, said to show considerable ore. Shipped, 1907, several small trial parcels of copper ore to New South Wales smelters, but, owing to fall in price of copper latter half of 1907, has concentrated efforts on gold claims.

ROGERS COPPER & IRON CO. TENNESSEE.

Dead. Formerly at Ducktown, Polk Co., Tenn. Described Vol. VI.

ROGERS FREEHOLD COPPER MINES, LTD. AUSTRALIA.

Office: Townsville, Queensland, Australia. Organized Aug. 31, 1907, under laws of Queensland, with capitalization £65,000, shares 10s. par.

ROGERS MINING CO. COLORADO.

Dead. Formerly at Pearl, Larimer Co., Colo. Described Vol. VI.

ROGERS SPRINGS MINING CO. ARIZONA.

Office: Detroit, Mich. Mine office: Cave Creek, Maricopa Co., Ariz. Lands, supposedly 20 claims, 36 miles from Phœnix, the nearest railroad point. Company is said to contemplate a smelter, with a first unit of 100 tons.

ROGUE RIVER MINING & SMELTING CO. OREGON.

Dead. Was abortive. Formerly at Grants Pass, Josephine Co., Ore. Described Vol. VI.

ROHR-GEDDES MINING & DEVELOPMENT CO. NEW MEXICO.

Office: Raton, N. M. Mine office: Clayton, Union Co., N. M. Fred Rohr, president; Robt. Vogl, vice-president; L. G. Gregory, treasurer; Frank A. Wall, secretary; J. E. Geddes, general manager. Lands, 420 acres, a few miles west of the Pittsburg Copper Co., in the Peacock Cañon district, having several pits and shafts of 15′ to 40′ depth, and a 267′ shaft showing sulphide ore said to assay 22% copper, with small gold and silver values.

RAFAEL ROJAS. CHILE.

Office and mine: Tres Puntas, Tocopilla, Antofagasta, Chile. Property includes Tres Puntas mines, showing a vein traceable 140 meters and opened to depth of circa 100 meters. In 1904 produced circa 200 metric tons of ore averaging about 17% copper tenor.

RONQUILLO COPPER CO. MEXICO.

Office and mine: 2 Postoffice Bldg., La Cananea, Arizpe, Sonora, Mex. A. D. Nanney, president; G. C. Eastman, vice-president and superintendent; P. J. Tehaney, secretary. Organized Aug. 31, 1905, under laws of Arizona,

pitalization $1,000,000, shares $1 par. Also is organized under laws of as Ronquillo Mining Co., S. A.
ids, 72 pertenencias, well timbered, known as the Ronquillo group, 4 om Janoverachi, 8 miles south of Cananea and one-half mile from the river. Formerly owned the Swansea group, sold circa 1907.
Ronquillo mine shows antigua workings, on a vein up to 40′ width, e nearly one mile, carrying cuprite, melaconite, malachite and azurite face, with an iron-porphyry gangue. Development is by tunnel and , of which No. 1 shaft, 71′ deep, shows 40″ of ore at the bottom, aver- 3% copper. No. 2 shaft, 32′ deep, has given ores assaying up to 35% Both Nos. 1 and 2 shafts were abandoned on account of soft ground. he main working shaft, with 2 compartments, is sunk in country rock, circa 100′ deep at last accounts. Water in this shaft is strongly im- d with copper, and the ores carry fair gold and silver values.

ILLO MINING CO., S. A. **MEXICO.**

he Mexican incorporation of the Ronquillo Copper Co.

ERG COPPER CO., LTD. **TRANSVAAL.**

d. Liquidated, 1907. Formerly in the Transvaal.

ERG MINERALS DEVELOPMENT CO., LTD. **TRANSVAAL.**

ce: Oceana Bldgs., Johannesburg, Transvaal. Organized May, 1908, ws of Transvaal with capitalization £150,000. Company has no con- with New Rooiberg Minerals Syndicate, Ltd. Lands, in the Rooiberg of the Transvaal, were taken over mainly from the Oceana Mineral ., Farrar Bros., and Anglo-French, Ltd.

TS COPPER CO. **CAPE COLONY.**

ce: care of H. Sothcott, secretary, Johannesburg, Transvaal. Mine Upington, Cape Colony. Chas. A. O. Bain, chairman; preceding officer, Poole, Gustav Sonn and W. J. Holmes, directors. Organized August, der laws of Transvaal, with capitalization £6,000.
ids are mining rights to the Farm Rooiputs, area 13,400 morgen, equiva- circa 25,000 acres, adjoining the Areachap property on the north, held option from June 30, 1908, at £1 per month for first year, and month for second year, with right to remove all ore at 2s. 6d. per ton, term of the option, and privilege of purchasing the mineral rights on m Rooiputs for £10,000 and 500 shares in any company floated. Dia- have been discovered on the farm, and it is supposed to carry the ex- of the Areachap ore bodies.

WOOD COPPER CO. **ARIZONA.**

ie office: Globe, Gila Co., Ariz. Idle and apparently moribund.

VELT GOLD & COPPER MINING CO. **ARIZONA.**

ce: care of W. G. McDonald, president and general manager, P. O. , Bisbee, Ariz. Mine office: Ft. Thomas, Graham Co., Ariz. Property, from Ft. Thomas, has a 60′ shaft showing cuprite, malachite, chalco- chalcopyrite, of good assay values. Idle several years.

VELT GOLD, SILVER & COPPER MINING CO. **MONTANA.**

d. Was organized May, 1906, under laws of Montana, with capitali- 1,000,000; shares $1 par. Directors were Del Amsden, Simon Bank, Hogevoll, Daniel McNichol and Wm. Robertson. Formerly at Butte, ow Co., Mont.

IVER GOLD & COPPER SYNDICATE. **ONTARIO.**

ce and mine: Sault Ste. Marie, Algoma, Ont. B. W. Harris, president; llivan, vice-president; Alex McIntyre, second vice-president; T. Robin- retary; Wm. Calder, treasurer. Organized under laws of Ontario, with ation $1,000,000. shares $1 par. Lands are 40 acres surface rights, eral rights to 640 acres, in Section 32, Township of Aweres, 11 miles

north of Sault Ste. Marie, on the Algoma Central railroad. Lands have a 70′ shaft, showing a vein of 12′ to 16′ width, traceable circa 1,000′, carrying auriferous and slightly argentiferous copper ore, giving average assays of 2.37% copper.

RÖROS KOBBERVAERK. NORWAY.

Mine office: Röros, Trondhjem, Norway. Employs circa 700 men. Property is a group of old mines, including the Storvarts, Kongens, Kristian VI, Muggruben and Arvedals Grube, partly owned by the Norwegian government. From A. D. 1646 to 1897, this group of mines produced 73,000 metric tons fine copper, and exported 260,000 tons of pyrites, the aggregate value of this product being upwards of $35,000,000.

The Kongens and Arvedals groups carry chalcopyrite, and ore at the other properties is cupriferous pyrite, the ores ranging in copper tenor from 4.5 to 5% in the Kongens group, about 5% in the Muggruben, up to 6 to 7% in the Storvarts mine, the pyritic ores averaging about 45% sulphur.

Equipment includes a hydraulic power installation. The workmen are treated with great consideration, company running a special train to carry the men from the mine at Saturday noon, and bringing them back again similarly Monday morning.

Ore is matted in water-jacket blast-furnaces to a first-fusion product of about 37% copper tenor, which is resmelted to low grade pimple-metal, averaging 78% copper, which, in turn, is blown up, in Bessemer converters, to black copper of 95.5% tenor.

About 40% of the ore produced is exported for sulphur values only, though slightly cupriferous, and the balance smelted on the ground. Production, 1904, was 18,000 metric tons of ore smelted, averaging a trifle better than 4% copper, and 11,000 tons of pyrites exported, giving a total output of 1,641,920 lbs. fine copper, and in 1907 was 12,700 metric tons of cupriferous pyrite, yielding 1,365,000 lbs. fine copper. This is the second largest copper mine of Norway, and apparently should be able to increase production in the near future.

ROSALIE COPPER CO. ARIZONA.

Mine office: Meyer, Yavapai Co., Ariz. Samuel L. Casey, president; Wm. Nellis, first vice-president; Marshall Haddock, second vice-president; W. N. Rynerson, treasurer; E. M. Metcalf, secretary; Geo. C. Meese, general manager; preceding officers, Chas. Schifferdecker and Wm. A. Moses, directors. Organized under laws of Arizona, with capitalization $3,000,000, shares $1 par.

Lands, 9 claims, patented, area 180 acres, in the Copper Creek district, circa 25 miles southeast of Mayer and 18 miles from Cordes Siding, nearest railroad point, with a wagon road between. Mine has numerous pits and shafts, of 10′ to 148′ depth, and a 420′ tunnel, showing a 2′ to 3′ vein carrying native copper, cuprite, azurite, malachite and a little melaconite in the oxidized zone, followed by bornite, chalcopyrite and occasional chalcocite, giving assays up to 23% copper, average assays being 4.15 to 7.3% copper, with small gold and silver values. Has a 50-h. p. gasoline engine and air-compressor, and shipped, 1907, a little ore, returning circa 8% copper. Company's prospectus is filled with misleading general statements regarding the profits of copper mines. Closed down, 1907, but plans resumption.

ROSA AMARILLA COPPER CO. MEXICO.

Office: 33 Portland Blk., Chicago, Ills. Mine office: Pueblo Nuevo, Sayula, Jalisco, Mex. A. L. Dewar, president; Danl. Campbell, vice-president; F. W. Harnwell, secretary; L. E. Fuller, treasurer; John Mann, superintendent; John A. Kruse, engineer. Organized July 25, 1904, under laws of Maine, with capitalization $5,000,000, shares $1 par, and is organized under laws of Mexico as Rosa Amarilla Copper Co., Sociedad Anonima.

Lands, 5 groups, area circa 300 acres, including the Rosa Amarilla and

Ethel copper groups, and the Talpurito silver group, circa 30 miles southwest of Autlán. Company has 3 water rights denounced, and has leased a timber tract of 1,800,000 acres, which can furnish timber at practically cost of cutting.

Lands show 4 ore bodies, probably lenses, averaging 100′ and upwards in width, in a zone of circa 600′ width, with outcrops traceable several miles. Average of upwards of 300 assays gave 7.8% copper, 6 oz. silver and a trace of gold, from oxide, carbonate and sulphide ores. Development is by 2 shafts, deepest 105′, and 4 tunnels, in addition to which some diamond drilling has been done. Property is 26 miles from the Pacific and company controls a harbor known as Puerto de Natividad. A road between the mine and port can be built with a grade not exceeding 4% at any point, and averaging about 100′ per mile.

COMPAÑIA MINERA ROSARIO. **ARGENTINA.**

Mine office: Calamuchita, Córdoba, Argentina. Ore body is iron pyrites, carrying chalcopyrite, with quartz gangue, averaging 5% to 6% copper. Has a smelter with a 36″ blast-furnace, making matte averaging 65% copper and 30 oz. silver per ton, sent to Great Britain for reduction and refining, when mine is working. Idle at last accounts.

MINA ROSARIO. **CHILE.**

Mine office: Tamaya, Ovalle, Coquimbo, Chile. Is owned by the Familia Lecaros. Mine, opened 1850, is 590 meters, or about 1,900′, in depth. Produced, 1866-1888, ore to extent of 64,589 short tons, averaging 17.7 to 29.4% copper tenor. Idle for some years, owing to decreased ore values at depth, and heavy timbering charges, but, with a railroad to Tongoi, and modern equipment, could be worked to advantage.

MINAS ROSARIO i PROVIDENCIA. **CHILE.**

Mine office: Chañarcillito, Caldera, Atacama, Chile. Mine shows 2 parallel ore bodies, averaging 8 to 10 meters width, in diorite and limestone, traceable for some distance, one ore body showing oxidized ores of copper, associated with spathic iron, these averaging about 4% in tenor and requiring concentration. The second vein carries oxidized ores only, to depth opened, these averaging about 5% copper. Ores, which are free smelting, are sent to Tierra Amarilla for reduction. Production, 1903, was about 450 metric tons of ore, averaging 16% in tenor, equivalent to about 160,000 lbs. fine copper.

ROSELLE MINING CO. **BRITISH COLUMBIA.**

Dead. Formerly on Haskins Mountain, Liard River division, Cassiar district, British Columbia.

ROSEMONT COPPER CO. **ARIZONA.**

Office: 42 Broadway, New York, N. Y. Mine office: Rosemont, Pima Co., Ariz. Is controlled by the Lewisohn interests. Geological conditions are said to be similar to those at Bisbee, and ore bodies apparently are large. Idle for some years.

ROSEWOOD CREEK COPPER & GOLD MINING CO., LTD. **AUSTRALIA.**

Office: 7A Upper St. Martin's Lane, London, W. C., Eng. R. K. Evans, secretary. Mine office: Rosewood, Denison Co., Queensland, Australia. Organized July 31, 1903, as a reconstruction of Great Northern Copper & Gold Mining Co. of Queensland, with capitalization £100,000, shares 5s. par. Lands, 65 acres. Idle several years and apparently moribund.

ROSSLAND-GREAT WESTERN MINES, LTD. **BRITISH COLUMBIA.**

Dead. Reorganized, May 17, 1902, as Rossland-Kootenay Mining Co., Ltd. Formerly at Rossland, Trail district, B. C.

ROSSLAND-KOOTENAY MINING CO., LTD. **BRITISH COLUMBIA.**

Office: Salisbury House, London, E. C., Eng. Mine office: Rossland, Trail district, B. C. C. Williamson Milne, chairman; Bedford McNeill, consulting engineer; F. A. Labouchere, secretary. Organized May 17, 1902, under

ws of Wyoming, with capitalization $1,500,000, shares $1 par. Lands, 5 aims, area 50 acres, 100 miles from nearest railroad, having about 1,000′ of nnels, said to show considerable ore assaying $3.50 to $150 per ton, in gold, lver, copper and lead. Idle some years.

OWAN GOLD & COPPER MINING CO. **NORTH CAROLINA.**

Dead. Formerly at Gold Hill, Rowan Co., N. C. Described Vol. VI.

OYALBERG COPPER MINES, LTD. **NORWAY.**

Office: 2 Basinghall Ave., London, E. C., Eng. Mine office: Kongsberg, hristiania, Norway. E. T. Evans, secretary; E. C. Plews, manager and engiseer; Ingwolf Otterbeek, superintendent. Organized Apr. 24, 1903, under laws f Great Britain, with capitalization £100,000, shares £1 par; issued, £81,600. Debentures, £1,500 at 8% and £7,500 at 5%.

Lands, 18 claims, area circa 50 acres, title by crown grant, also 20 acres imber lands, in the Fiskum district, opened by shafts of 40′, 70′ and 100′, and y tunnels of 120′ and 250′, showing four 3′ fissure veins in volcanic micahists, giving average assays of 14% copper, 20% lead, 10% zinc and 24 oz. ilver per ton, from sulphide ores, and estimated to show 30,000 tons of ore, with 15,000 tons blocked out for stoping. The West Norway railroad is 2 miles listant, and it is proposed to develop 100 h. p. from a nearby waterfall. A small concentrator has been erected at the mine, and small shipments of conentrates have been made to British works.

OYAL CONSOLIDATED COPPER CO. **NEVADA.**

Dead. Organized 1907, under laws of Arizona, with capitalization 2,500,000. L. L. Crisp was president. Apparently was promoted by the late Rev. Col. W. P. Fife. According to printed reports, the company's expert explained that the formation was "dyarite," porphyry and limestone, with large "burns" of iron gossan, ore deposits consisting of copper, gold and silver, ying in a fissure "cutting" a contact of porphyry and lime. The ore body as claimed to be 250′ wide. Obviously was merely a bit of stock-jobbery. ormer office was at Goldfield, Nev. Former mine office was at Mina, Esmeralda Co., Nev.

OYAL CONSOLIDATED MINES OF EL COBRE, LTD. **CUBA.**

Dead. Succeeded, circa 1902, by El Cobre Mines. Formerly at El Cobre, antiago de Cuba.

OYAL COPPER CO. **NEW MEXICO.**

Dead. Property sold, 1901, to Aberdeen Consolidated Gold & Copper Co., lso dead. Formerly at Lordsburg, Grant Co., N. M.

OYAL COPPER MINING CO. **UTAH.**

Dead. Title changed, 1902, to Cactus Smelting & Copper Co., also dead. ormerly at Frisco, Beaver Co., Utah. Fully described Vol. II.

OYAL COPPER MINING CO., LTD. **MONTANA.**

Office: Wallace, Idaho. Mine office: Belknap, Sanders Co., Mont. Chas. . Johnson, superintendent. Surface trenches show ore, and a 463′ crosscut nnel cuts, at 400′, a vein said to average 6% copper and 18% lead, with nall silver values.

OYAL CROWN MINING CO. **MEXICO.**

Office: Independencia No. 38, Oaxaca, Mex. Mine office: Ocotlán, Oaxaca, ex. Gustavo Stein, president; Teodoro Meyer, secretary and treasurer; . Hopley Woolrich, general manager; Martin Aguirre, superintendent. Orinized under laws of Mexico, with capitalization 300,000 pesos, shares 1 peso ir; paid in, 135,000 pesos.

Lands, 80 acres, also a 10-acre smelter site, in the Ocotlán district, showing contact veins, between quartzite and andesite, of which two are being develed, these averaging 3 meters width and giving average assays of 13% copper, 9 grams silver and $11.50 gold per metric ton, from malachite, azurite and

chrysocolla in the oxidized zone, and from chalcopyrite in the base zone. Mine is opened by shafts of 122′ and 125′, and is served by the Ocotlán & Ejutla railway, one-half mile distant. Presumably idle.

ROYAL GOLD & COPPER MINING CO. UTAH.

Dead. Apparently merged, circa 1904, in Nevada-Utah Mines & Smelters Corporation. Formerly at Milford, Beaver Co., Utah. Fully described Vol. II.

ROYAL METALS MINING & LEASING CO. NEVADA.

Mine office: Ely, White Pine Co., Nev. Organized circa April, 1907.

ROYAL MINING & INVESTMENT CO. COLORADO.

Mine office: Silverton, San Juan Co., Colo. W. R. Pyke, superintendent. Has argentiferous lead and copper ores, with steam power equipment, employing circa 20 men.

ROYAL MORELOS COPPER CO. MEXICO.

Dead. Was succeeded, 1908, by Occidental Copper Co. Was organized under laws of Arizona or Maine, or both, with capitalization $500,000, shares $1 par, holding lands through the Compañía Cobre de Morelos, S. A., organized under laws of Mexico. Officers were as follows: Hon. Aylett R. Cotton, president; Alfred Courchesne, vice-president; Emlyn Lewys, treasurer; James W. Magoffin, secretary; Edward C. Kemble, assistant secretary; S. W. Ferguson, general manager; D. B. Davison, superintendent. Lands were 13 hectares, in 6 groups, lying one-half mile to 3 miles south of the international boundary line, in the district of Ciudad Juárez, in the extreme northwestern corner of the state of Chihuahua, Mexico, showing slightly auriferous and argentiferous copper ore, giving assays up to 64% copper. Former office was 1300 Golden Gate Ave., San Francisco, Cal. Formerly at Victoria, Donna Ana Co., N. M.

ROYAL THARSIS MINING CO. TASMANIA.

Dead. Lands sold, for £13,347, to Mount Lyell Mining & Railway Co., Ltd. Formerly at North Mount Lyell, Montagu Co., Tasmania.

ROYAL VICTORIA MINING CO. BRITISH COLUMBIA.

Mine office: Grand Forks, Boundary district, B. C. John Fox, superintendent, at last accounts. Property is the Golden Eagle mine, circa 12 miles from Grand Forks, having about 400′ of openings, showing auriferous copper ore of good grade with calcite gangue. Idle at last accounts, awaiting better transportation facilities.

RUBEÑA MINING CO. MEXICO.

Office: 1208-134 Monroe St., Chicago, Ills. Mine office: La Poza, Ures, Sonora, Mex. Wm. E. Jones, president and general manager; Hon. Victor Aguilar, vice-president; R. C. White, secretary; E. J. White, treasurer; Hon. Ricardo P. Cubillas, assistant treasurer; H. F. Wiggin, superintendent. Organized Nov. 26, 1906, under laws of Arizona, with capitalization $5,000,000, shares $1 par. Chicago Title & Trust Co., registrar. Annual meeting, first Monday in November.

Lands, 140 acres, held in trust, by the vice-president, until company is protocolized, or a holding company formed, under the laws of Mexico. Lands show 4 fissure veins, in granite, of which 2, under development, traceable about 1½ miles on company's property, range 30″ to 8′ in width, opened by shafts of 326′, 150′ and 100′ and by tunnels of 225′ and 30′, showing ore averaging about 2.2% copper, 8% lead, some zinc, 15 to 2,550 oz. silver and from a trace to $5 gold per ton, ore being mainly sulphides, with occasional carbonates. Company estimates 5,000 tons of ore on the dumps and 10,000 tons broken in the stopes. Property, opened 1835, was worked intermittently thereafter by Mexican owners. Has steam power, with 6x8″ hoist good for 500′ depth, and 10 mine buildings. Plans building a 100-ton concentrator.

RUBY COPPER & GOLD MINING CO. WYOMING.

Dead. Formerly at Encampment, Carbon Co., Wyo.

RUBY GOLD & COPPER CO. **MEXICO.**

Dead. Formerly at San Marcial, Sonora, Mex. Fully described Vol. VI.

RUBY HILL COPPER MINING & SMELTING CO. **CALIFORNIA.**

Dead. Formerly at Coppervale, Lassen Co., Cal.

RUBY HILL TUNNEL & MINING CO. **NEVADA.**

Mine office: Eureka, Eureka Co., Nev. A. P. Mayberry, superintendent, at last accounts. Lands, between the Richmond and Connor mines, are opened by a tunnel, said to be 2,200′ long. Presumably idle.

RUBY KING COPPER MINING & TOWNSITE CO. **CALIFORNIA.**

Dead. Formerly in Colusa county, California.

RUBY MINING CO. **WASHINGTON.**

Office: Mansfield, Ohio. Mine office: Nighthawk, Okanogan Co., Wash. Monroe Harman; president; Jas. A. Hauer, vice-president; Chas. B. Bushnell, secretary and treasurer; preceding officers, M. L. Branyan and S. P. Ecki, directors. Organized Nov. 15, 1902, under laws of Washington, with capitalization $1,500,000, shares $1 par; issued, $1,175,000. Annual meeting, second Tuesday in June.

Lands, 7 claims, unpatented, area 136 acres, with 46 acres miscellaneous lands, held in fee, on Mt. Chopaca, near the Similkameen river, 3 miles south of the international boundary, and within 600′ of the Great Northern Railway. Lands show syenite carrying 3 lenticular ore bodies with northwesterly and southeasterly strike, and dip of 47°, one of which, under development, is of about 4′ average width, traceable 1,000′, carrying cupriferous pyrargyrite, assaying 0.5% copper, 2% lead, 1.5% zinc, 5 to 2,000 oz. silver and 80 cents gold per ton. Development is by crosscut tunnels of 226′ and 1,011′, and a 197′ tunnel in ore, with total workings of circa 6,300′, estimated to show 60,000 tons of ore. Property has no equipment. Company shipped 7 carloads of ore, 1907, netting $5,500. Idle since June 1, 1908, but management plans resumption, and the installation of a power plant.

RUDDYGORE MINE. **AUSTRALIA.**

Owned by Chillagoe Co., Ltd.

RUDIANSKI MINES. **RUSSIA.**

Office: care of P. T. Zamiatnin, Perm, Russia. Mine office: Bogoslovsk, Nijni-Tagilsk, Perm, Russia. Property is a group of old mines, including the Miednoroudiansk, famous for its great variety of copper minerals, including oxides, carbonates, silicates and phosphates, with occasional native copper, and especially notable for its production of massive malachite, a single mass weighing 330 tons having been found in 1836. Ore occurs as local enrichments, of good average tenor, in Permian red beds. Latest production officially reported, 1899, was 3,122,112 lbs. fine copper but is estimated at 2,500,000 lbs. fine copper only, for 1907.

RUDOLPH LAND CO. **WISCONSIN.**

Office: care of Rudolph M. Weyerhaeuser, Cloquet, Minn. Mine office: Gordon, Douglas Co., Wis. Organized circa 1905, succeeding the Minong Range Copper Co. Lands are in Sections 11, 12, 13 and 14, Range 43 North, Town 10 west. Property is on the southern fold of the Keweenawan syncline, opened by two 7x10′ shafts, deepest 100′, sunk at 36° in a dark amygdaloidal rock, carrying native copper in small quantities. Property is fully described, under title Minong Range Copper Co., Vol. III.

SOCIEDAD ANONIMA COBRES DE RUESGA. **SPAIN.**

Office: Bilbao, Spain. Mine offices: San Martin de Los Herreros, Palencia, Spain, and Dehesa de Montojo, León, Spain. Don Julio Lazúrtigui, president; Don Augustin Cortina, secretary. Organized 1901, with capitalization 2,500,000 pesetas, shares 500 pesetas par. Property includes the Leonor and adjoining mines. Presumably idle.

RUMAILLANA TUNNEL CO. P

Mine office: Cerro de Pasco, Junín, Perú. Development is by the Y cocha and Mesapeta shafts, suspended 1905, and by the Rumaillana, or M drainage tunnel, planned to drain and open the entire Cerro de Pasco di Tunnel was circa 1,800 meters long, 1906, but had cut none of the ex ore bodies.

RUSH & BROWN. ALA

Office and mine: Kasaan, Alaska. U. S. Rush and George E. Brown ers; John Rigby, mine superintendent. Lands, 8 claims, area 160 acre a 15-acre millsite, on Karta Bay, in the Ketchikan district, showing felsite, quartzite, conglomerate and chloritic schists, with occasional stone, carrying chalcopyrite, associated with magnetite, in veins a lenticular masses, in 3 ore bodies, having a generally east and west str which 2, developed by shafts of 20′, 80′ and 80′, and by 3 tunnels, longe show an average width of 8, giving ore assaying 3.5% copper, 1 oz. silv $2 gold per ton. Has a small steam hoist and several mine buildings. is served by a tram, taking ore to wharfs at Venus Bay, 3 miles distant, loaded on vessels and barges, for shipment to smelters. Shipped son 1907, of good average tenor. Suspended operations, late 1907, on acc depression in metal market.

RUSSELL-BALL COPPER CO. AL

Mine office: Valdez, Alaska. Lands, on Dryer Bay, are said to s 8′ body of copper ore.

RUSSELL GULCH MINING & DEVELOPMENT CO. COLO

Dead. Formerly at Russell Gulch, Gilpin Co., Colo.

RUSSELL UNITED COPPER CO. ARI

Dead. Lands sold, circa 1904, to Arizona Consolidated Mining Co merly at Benson, Cochise Co., Ariz.

RUSTLER MINING & MILLING CO. MON

Mine office: Libby, Flathead Co., Mont. Property is the Snowsho said to have shipped about $800,000 worth of ore, but idle since circa 1 account of litigation.

RUTHBURG CONSOLIDATED COPPER CO. I

Dead. Formerly at Weiser, Washington Co., Idaho. Described Vo

RUTHERFORD COPPER MINING CO. TASM

Mine office: Burnie, Russell Co., Tasmania. Ore is said to averag in copper tenor. Idle at last accounts.

RYE COPPER CO. ARI

Office and mine: care of Chas. T. Martin, secretary, Globe, Gila Co E. F. Eisenhour, president and general manager. Organized 1905, und of Arizona, with capitalization $1,000,000, shares $1 par. Lands, 17 well timbered and suitable for grazing, with an available water-power, the Mazatzal Mountains, in a slightly explored district, circa 75 mile of Globe and about the same distance south of Flagstaff. Country diorite, with intrusive porphyry dikes, carrying contact veins showing s ores associated with hematite, near surface. The mine has circa 1,000′ o ings, including shafts, tunnels and trenches. Idle.

SAAVEDRA i BESA. C

Mine office: Quebradita, Freirina, Atacama, Chile. Cornelio Saave Alfonso Besa, owners and managers. Lands, 3 hectares, 27 kilometers fro Clanca, showing a fissure vein in granite of about 5′ average width, wit of N. 42° E., and 66° dip. Mine is opened to depth of 418 meters, w treme length of 270 meters of horizontal workings, showing an oxidiz of about 40 meters depth, succeeded by sulphides, mainly chalcopyri quartzose gangue, averaging 16% copper. Water is encountered at 11

plant with three 70-h. p. boilers, and an electric plant for lighting and te pumps and mill. Employs about 140 men. Production, 1903, was 00 metric tons of ore of 16% average copper tenor, equivalent to about bs. fine copper.

WEA GOLD & COPPER MINING CO. **MONTANA.**

e: 11 Broadway, New York, N. Y. Mine office: Helena, Lewis & ., Mont. Col. Henry Altman, president and general manager; W. J. ecretary. Capitalization $5,000,000, shares $10 par. Lands, 47 claims, cratch Gravel district, adjoining the Copper-Silver Montana Mining said, 1907, to plan sinking 3 shafts. Presumably idle.

N SPRINGS MINING CO. **CALIFORNIA.**

er returned unclaimed from former mine office, Cima, San Bernardino L. I. Plummer, president and general manager; E. P. Barnes, secre- n. Heath, superintendent. Lands, 17 claims, on the western slope of k Mountain, carrying circa 3 miles of the strike of a contact deposit limestone and granite, ranging up to 65′ width, opened by a 100′ shaft 0′ tunnel.

MOUNTAIN MINING CO. **ARIZONA.**

e: 902 Chapel St., New Haven, Conn. Mine office: Christmas, Gila . Lewis S. Welch, president; Clarence Stephens, vice-president; Story secretary; Wilbur W. Delano, treasurer; Wm. D. South, manager; Jas. , smelter superintendent. Organized 1902, under laws of Arizona, with tion $1,000,000, increased, later, to $2,500,000, shares $1 par; issued, 0. Debentures, $1,000,000 first-mortgage 6-year 6% bonds, dated Oct. issued, $625,000. Floating indebtedness was cared for, Oct. 1, 1908, of 6-month notes, with privilege of 6 months renewal, at option of any.

ls, 1,441 acres, patented, with abundant water, on both sides of the r, in Gila and Pinal counties, circa 25 miles due south of Globe and rth of Tucson. Property includes copper claims lying north of the l gold, silver and coal claims directly opposite, south of the river, all lying in a radius of 6 miles.

e are 15 claims, patented, area 266 acres, of gold and silver lands, base dry ore, with a little lead and zinc and traces of copper, the of upwards of 300 assays giving a trifle better than $13 per ton in gold and silver values. The gold and silver claims have 3,450′ of

coal lands, 640 acres, patented, in the lower basin of Deer Creek, vein of low grade bituminous coal, developed by a 175′ incline shaft, a 800′ of workings, equipped with a small steam hoist and pump. a beehive coke-oven on the property, ready for test, as the coal may or prove available for coking, but is adapted to making producer gas.

e are 36 patented copper claims, area 535 acres, the principal group the junction of Disappointment Valley with the Gila river, on the e of the stream, 8 miles from Winkelman, present terminus of the & Eastern railroad, which is the nearest shipping point. The mine ed, 1883, by the San Carlos Copper Co., but was closed, 1884, because be located on the San Carlos Indian Reservation, and remained idle lands were restored to the public domain, by executive order of the Dec. 2, 1902.

property shows members of the upper Carboniferous limestone in tages of alteration, near a granite-porphyry contact, ores occurring irregular line of contact for circa 6 miles on the company's lands, replacements in limestone, and principally as carbonate ores, with ous gangue, on the limestone wall, and sulphides along the porphyry

contact at depth. The contact zone has shown copper ore wherever opened and the porphyry also carries copper ore below workable tenor. Four major ore bodies are under development, these ranging from 4′ to 60′ in width, carrying cuprite, malachite, chalcocite, bornite and chalcopyrite, latter disseminated in pyrite, all slightly auriferous and argentiferous, and self-fluxing throughout. Ore as mined has averaged about 3% copper and 30 to 40 cents per ton in combined gold and silver values, by wet assay.

Development is by shafts of 430′, 340′, 275′ and 175′, all showing oxidized and sulphide ores, and the company has planned a tunnel of circa one mile length, to connect with the 300′ main working shaft. The Christmas shaft, started 1907, has 3 compartments, each 4x5′ in the clear, and is planned for the main working shaft. No. 1 or Hackberry shaft, the deepest, shows good ore on the 120′ level, said to average 3.75% copper, also good ore on the 300′ level, the upper workings showing a blanket vein of about 6′ thickness, said to be proven for 300′ in width and 625′ in length. The 400′ level is said to show ore averaging about 5% copper tenor. The mine has circa 12,000′ of workings, with a large quantity of ore in sight, though very little is blocked out systematically, but considerable ore could be developed for stoping with little effort. The mine also has open-cast workings, of circa 30,000 square feet area, showing carbonate ores.

Equipment includes a 75-h. p. steam plant, with 4 small hoists, good for circa 500′ each, and there are larger hoists on the ground, but not installed. There are 10 buildings for various uses.

The smelter, at the mine, receiving ore therefrom by wagon and tram, has a daily capacity of circa 225 tons. The old smelter, erected, 1884, by San Carlos Copper Co., was torn down and furnaces replaced by a 150-ton Mitchell economic hot-blast furnace, which apparently has been replaced also by a 36x122″ Colorado Iron Works blast-furnace, of circa 225 tons daily capacity. The major part of the material for a 500-ton furnace, 44x200″ in size, is on the ground, but not set up. Ore is self-fluxing, and the slags carry about 36% silica and 23% iron. Product, when smelter is in blast, is matte carrying 60 to 65% copper, 10 to 14 oz. silver and circa 0.35 oz. gold per ton. A little custom smelting was done, when the smelter was in commission, to accommodate neighboring properties. Company was said, September, 1907, to have secured a site for a new smelter, at Christmas, about 1½ miles from the mine.

In addition to the railroad of the Phoenix & Eastern, the Southern Pacific is building a low grade cut-off line, to pass through the smelter site within a mile of the mine. The company did some grading, 1907, for a narrow railroad from Winkelman station to the mines and works at Christmas, having completed grading for 3 miles of line, except 3 or 4 short bridges, with rails, ties and one locomotive on the ground.

Production has been as follows: 450,000 lbs. fine copper in 1905; 2,338,492 lbs. copper, 16,410 oz. silver and 437 oz. gold in 1906; 1,751,264 lbs. copper, 7,453 oz. silver and 254 oz. gold in 1907.

Previous to blowing out of smelter the company made circa $800,000 worth of matte, and, at one time, 1907, it employed nearly 600 men, but closed down Aug. 21, 1907, owing to financial troubles. The property is considered decidedly promising, but the company requires cash for more extensive development of ore, improvement of transportation facilities and enlargement of smelter.

SADO MINE. JAPAN.

Owned by Mitsu Bishi Goshi-Kwaisha.

SAGINAW DEVELOPMENT CO. ARIZONA.

Dead. Merged, March, 1906, in American-Saginaw Development Co. Formerly at Bisbee, Cochise Co., Ariz. Described Vol. V.

SAGINAW MINING CO. **WASHINGTON.**

Dead. Formerly at Maple Falls, Whatcom Co., Wash.

SAGINAW VALLEY COPPER MINING CO. **WYOMING.**

Dead. Lands lost, 1905. Formerly at Encampment, Carbon Co., Wyo. Described Vol. V.

SAHUARIPA EXPLORATION CO. **MEXICO.**

Mine office: Sahuaripa, Sonora, Mex. Lands include the Esperitu Santo mine, 12 miles east of Sahuaripa, opened circa 1842, and closed in 1900, owing to striking of water. This has a blanket vein of argentiferous and plumbiferous tetrahedrite, carrying up to 250 oz. silver per ton. Idle several years.

ST. CROIX CONSOLIDATED COPPER CO. **WISCONSIN.**

Office and mine: Superior, Douglas Co., Wis. Organized 1903, under laws of Wisconsin, with capitalization $1,500,000, shares $1 par. Lands, 9 groups, area 22,000 acres, carrying the western extension of the Keweenawan copper belt of Michigan. Idle since organization.

ST. DAVID'S GOLD & COPPER MINES, LTD. **WALES.**

Dead. Succeeded, July 21, 1903, by St. David's Gold mines (1903), Ltd. Formerly at Barmouth, Merionethshire, Wales.

ST. DAVID'S GOLD MINES (1903), LTD. **WALES.**

Office: 29 Cornhill, London, E. C., Eng. Mine office: Barmouth, Merionethshire, Wales. Godfrey C. Isaacs, chairman; E. T. McCarthy, consulting engineer; H. J. Nicholls, mine manager; James Junner, secretary. Organized July 21, 1903, under laws of Great Britain, as a reconstruction of St. David's Gold & Copper Mines, Ltd., with capitalization £60,000, shares 5s. par. Debentures, £40,000 authorized, £10,750 outstanding, at 6%. Old company paid dividends of 40%; present company has paid dividends of 10%. Lands, 800 acres, carrying gold and copper ores. Has a 50-stamp mill and an Elmore oil concentration plant.

ST. GEORGE COPPER & COAL MINES, LTD. **AUSTRALIA.**

Office: Brisbane, Queensland, Australia. Mine office: Laura, Queensland, Australia. Organized 1906, under laws of Queensland, with capitalization £50,000. Lands are leasehold copper claims near Etheridge, in the Cook district, on which exploratory work has given promising results, also copper and coal lands at Little River.

ST. GEORGE COPPER MINING CO. **UTAH.**

Office: care of Clarence K. McCornick, president, Salt Lake City, Utah. Mine office: St. George, Washington Co., Utah. Capitalization $400,000. Grant C. Snyder, secretary and manager; B. L. Cutler, superintendent. Lands, in the Dugway Mountains, have a 100′ main shaft, on a 4′ to 5′ vein, giving assays of 4 to 40% copper. Has gasoline power and a small smelter, and was doing systematic development work and levying assessments, at last accounts. Management considered good, and property well regarded.

ST. HELEN'S COPPER CO., LTD. **ENGLAND.**

Works office: St. Helen's, Lancashire, Eng.

ST. JOE GOLD-COPPER MINING & MILLING CO., LTD. **MONTANA.**

Office: Wallace, Idaho. Letter returned unclaimed from former mine office, Saltese, Missoula Co., Mont. Lands, 9 claims, well timbered, on Kelly Creek, circa 3 miles west of the Monitor and one-half mile from a railroad, showing 2 strong ledges.

ST. JOE MINING CO. **UTAH.**

Dead. Property sold, circa 1907, by sheriff, for $25,000, this sum being inadequate to meet company's indebtedness, amounting to about $60,000. Formerly at Bingham Canyon, Salt Lake Co., Utah.

ST. JOE MINING & MILLING CO. **WASHINGTON.**

Office and mine: Latah, Spokane Co., Wash. Employs 5 men. I. H.

Stockdale, president; J. W. Olney, vice-president; J. A. Adams, secretary treasurer; E. H. Conrad, superintendent. Organized 1906, under laws of ington, with capitalization $7,500,000, shares $5 par. Annual meeting Monday in December.

Lands, 13 claims, one fractional, area circa 255 acres, well timber miles from Chicago, Milwaukee & St. Paul railway, showing quartzite, shafts of 20′ and 80′. Property has 3 buildings. Company plans cont tunnel, to cut an expected ore body at depth of circa 250′.

ST. JOE MINING & MILLING CO. WYO

Office: Fremont, Neb. Letter returned unclaimed from former mine Riverside, Carbon Co., Wyo. H. S. Beck, president; J. H. Knowles, tre Thos. Carroll, secretary and general manager. Organized 1905, as succe Fremont Copper Mining Co. Lands, 5 claims, unpatented, in Purgatory opened by a 362′ incline shaft.

ST. JULIAN GOLD MINING CO. MON

Office: care of W. A. Bercry, president, 61 East Warren Ave., I Mich. Mine office: Chico, Park Co., Mont. Has auriferous and argent copper ores, with steam power and an Elspass mill. Presumably idle.

ST. LAWRENCE MINE. MON

Mine office: Saltese, Missoula Co., Mont. Lands are near the Ri and Monitor mines, 6 miles southwest of Saltese, with ore opened on lying parallel to those of the Richmond and Monitor. Idle.

ST. LAWRENCE MINE. MON

Owned by Anaconda Copper Mining Co., at Butte.

ST. LOUIS COPPER CO. ARI

Dead. Formerly at Gila Bend, Maricopa Co., Ariz.

ST. LOUIS COPPER CO. MICH

Office: 12 Ashburton Place, Boston, Mass. Mine office: Calumet, ton Co., Mich. Organized under laws of Michigan, with capital $1,000,000, shares $25 par. Is controlled, through ownership of 36,400 out of 40,000 issued, by Calumet & Hecla Mining Co.

Lands, 800 acres, near Laurium, including the south half of Section west half of Section 20, Town 56 North, Range 32 West. Lands lie nex of the Old Colony, east of the Laurium and southeast of the Calumet &

Property was called originally the New York & Michigan, opene under permit from the War Department, and later became the Wash changing that name, eventually, to present title. In olden days a sha sunk at the point of junction between the trap belt and the Eastern stone, this showing some fine copper. Long idle.

ST. LOUIS COPPER MINING CO. ARI

Office: 503 Security Bldg., St. Louis, Mo. Mine office: Duquesne, Cruz Co., Ariz. Jas. W. Shaw, president; Silas Cook, vice-president; Ge lon, secretary; H. W. Herweck, treasurer; S. G. McWade, general m Organized circa 1906.

ST. LOUIS GOLD GULCH MINING CO. NEW M

Mine office: Silver City, Grant Co., N. M. G. A. Easton, manage gold and copper ores, and a 50-ton concentrator.

ST. LOUIS UNITED COPPER MINING CO. NEW M

Dead. Formerly at Jarilla, Otero Co., N. M.

ST. MARIE COPPER CO. COLO

Dead. Was a swindle, perpetrated by John Reilly and W. W. Wils notorious confidence men. Formerly at Leadville, Lake Co., Colo.

ST. MARY'S CANAL MINERAL LAND CO. MICH

Entire stock issue is held by St. Mary's Mineral Land Co.

MARY'S COPPER CO. **MICHIGAN.**

Dead. Wound up, circa 1899, and lands sold to Arcadian Copper Co. Formerly at Hancock, Houghton Co., Mich. Described Vol. II.

MARY'S MINERAL LAND CO. **MICHIGAN.**

Office: 713-199 Washington St., Boston, Mass. Mine office: Houghton, ughton Co., Mich. Employs circa 50 men. Nathaniel Thayer, president; s. J. Paine and J. Henry Brooks, vice-presidents; Chas. J. Paine, Jr., secury and treasurer; preceding officers, Samuel N. Brown, Albert S. Bigelow, Nelson Perkins, Geo. P. Gardiner, Nathaniel H. Stone, Walter Hunnewell Chas. H. King, directors; Fred W. Nichols, resident agent; Dr. Lucius L. bbard, general manager and consulting geologist; Rex R. Seeber, mine superndent; Wm. Skewes, mining captain.

Organized March 4, 1901, under laws of New Jersey, with capitalization 00,000, shares $25 par; issued, $4,000,000. Controls, through ownership of re stock issue, except founders' shares, St. Mary's Canal Mineral Land Co., anized 1863, under laws of New York, to take over lands given by the state Michigan for the construction of the first ship canal at Sault Ste. Marie, is so given being 180,000 acres in Houghton, Ontonagon and Keweenaw nties, Michigan, from which tracts the Calumet & Hecla, Baltic, Trimoun-, Champion, Ojibway and other mines have been developed. Company has a 400 shareholders. Shares are listed on the Boston Stock Exchange. Old ny Trust Co., Boston, registrar.

Dividends have been as follows: $1 in 1903; $1 in 1904; $2 in 1905; $4 in 6; $5 in 1907; nothing in 1908, giving a total of $13 per share to end of 8. The company is in receipt of a large income from dividends of the mpion Copper Co., receiving $500,000 in 1907 and $150,000 in 1908 there-m, but in 1908 paid over $220,534 to King Phillip Copper Co., hence paid dividends. The company received, 1908, from lands sold to North Lake pper Co., $72,000 cash, in addition to a share interest. During 1905 the mpany sold lands, timber and wood, to the value of $275,292, and during 7 received $1,800 on land payments, $2,712 for wood and timber, $2,147.72 und rent, $12,580.45 interest on notes and contracts, $4,843.11 from miscelneous sources, and $500,000 from dividends of Champion Copper Co. Exditures for 1907 included $59,000 for the Challenge mine, and $108,456 for ck of King Phillip Copper Co., company ending 1907 with $237,390.94 cash hand.

From 1863 to 1900 the old company paid cash dividends of $2,200,000, also ck dividends of 1 share Tamarack, 1 share Iroquois, 1½ shares Baltic, ½ are Winona and ½ share Albany & Boston, on each share of stock of St. ry's Canal Mineral Land Co.

Share assets of the company at end of 1908 were as follows: 50,000 shares mpion Copper Co.; 73,767 shares King Phillip Copper Co.; 25,000 shares yflower Mining Co.; 20,165 shares La Salle Copper Co.; 20,000 shares Hanck Consolidated Mining Co.; 20,000 shares Pacific Copper Co.; 9,000 shares rth Lake Copper Co.; 2,000 shares Ojibway Mining Co.; 842 shares Winona pper Co.; 208 shares Copper Range Consolidated Copper Co.; 640 shares St. ry's Mineral Land Co.; 80 shares Old Colony Copper Co.; 10 shares Amphime Co. These holdings in various corporations were worth about $6,000,000, end of 1908.

Lands, Jan. 1, 1908, were 95,158 acres freehold, also mineral rights to 323 acres additional, lands being scattered along the Lake Superior copper t, with principal holdings on the South Range, southwest of Houghton, in ughton and Ontonagon counties.

The Challenge mine, owned outright by the company, is in Section 22, T. N., R. 35 W., circa 5 miles south of the Champion. This property works

4 power drills, and, during 1907, made 2,859′ of openings. Extensive diamo drill borings having located what supposedly is the southern extension of t Baltic amygdaloidal bed. Sinking was begun, Sept. 10, 1904, and a verti shaft, in the footwall, was 846′ deep at end of 1907. Workings show cons erable faulting, the Baltic bed having displacements of about 100′, equal t horizontal movement of 400′. The bed is 20′ to 35′ wide, showing some he copper, in small pockets, at rare intervals.

In addition to the Baltic lode, a number of other cupriferous beds h been opened by crosscuts from the Challenge shaft. Bed No. 2 is an amy loidal conglomerate, apparently without workable values. Beds 3 and 4 amygdaloids, showing a little copper. Bed No. 5 is an epidotal amygda showing copper in promising quantities. Bed No. 6, circa 25′ in width, ca no workable values. Bed No. 7, of 18′ width, carries considerable stamp Bed No. 8 is 47′ wide, where cut, carrying some fine copper. Bed. No. 9 a fair showing of copper. Bed No. 10 apparently is of small promise.

Equipment at the Challenge includes a 12x20″ Nordberg duplex good for 1,500′ depth, and an 8-drill Nordberg air-compressor. The Cha property is considered promising, though developments to date have p disappointing.

Beginning with the new century, the company refused to sell its m lands outright, preferring to join its lands with other holders in the form of new companies, taking pay therefor in shares, on a pro rata basis, or in shares and partly in cash. This policy involves heavy outlays for e atory and development work, but has resulted in giving the company interest in a magnificent new mine, the Champion, which is capable, alo furnishing funds to St. Mary's company for both dividends and develo work elsewhere, and a continuance of this policy must result, even in making St. Mary's Mineral Land Co. the part or sole owner of a n of fine mines. Owing to the great extent of its lands, mainly located Keweenawan copper belt, and stretching along the mineral range for of miles, the landed holdings of the company are of vast potential value management is vigorous and far-seeing, and no small share of the cred the present wise and successful policy is due to Mr. Rufus R. Goodel resigned, 1908, after 43 years of continuous and able service as the com resident agent.

ST. MICHAEL'S MINING, MILLING & REFINING CO. NEW ME

Mine office: Tres Piedras, Taos Co., N. M. Long idle.

ST. PAUL & BUTTE MINING CO. MONT

Dead. Was in business circa 1896. Formerly at Butte, Silver Bow Co.,

SAINT PAUL MINING & REDUCTION CO. COLO

Mine office: Silverton, San Juan Co., Colo. D. M. Cleamon, Ne Johnson, Geo. T. Braden, J. B. Ross and Frank L. Ross, directors. Org circa March, 1908, under laws of Colorado, with capitalization $100,000, $1 par. Property is an old mine, in the Red Mountain district, formerly ducer, which shipped some ore netting $1,000 per carload.

ST. REGIS COPPER MINING CO., LTD. MONT

Office: Wallace, Idaho. Mine office: St. Regis, Missoula Co., Mon ganized circa March, 1906. Lands, bought for $35,000, show auriferous ore. Presumably idle.

ST. REGIS COPPER MINING & MILLING CO. MONT

Office: Missoula, Mont. Mine office: St. Regis, Missoula Co., Mont ploys 5 men. S. J. Wilson, president; F. W. Wilson, secretary and tre Louis C. McHeffey, general manager; preceding officers, W. H. Houste A. M. Stevens, directors. Organized May, 1901, under laws of Montana capitalization $300,000, shares $1 par, in half preferred and half common

Lands, 5 claims, also a 15-acre millsite and miscellaneous lands, giving ings of 180 acres, on the Northern Pacific railway, in an unorganized dis- of Sanders county, Montana. Property shows quartzite and shale, hav- 2 ore bodies under development, of 6′ estimated average width, traceable 2,000′, carrying chalcopyrite giving average assays of 8% copper and gold per ton. Property has shown ore assaying 16 to 37% copper. De- pment is by tunnels of 60′, 380′, 800′ and 350′, estimated to show 5,000 of ore.

ERO MINES CO. **ARIZONA.**

Office: Tucson, Ariz. Mine office: Patagonia, Santa Cruz Co., Ariz. Prof. P. Blake, general manager; W. E. Balcom, superintendent. Is not incor- ed. Lands, in the Salero and Tyndall districts, circa 12 miles northwest tagonia, include the old Salero and Tumacacori properties, showing veins, rsing diorite, carrying galena, gray copper and native silver, in a gangue nganese, spar and quartz, opened by a crosscut tunnel.

he Constitution or Darwin claim has a vein of 10′ to 20′ width, carrying s of high grade copper ore, including stromeyerite and its derivative min- with quartz gangue, opened by a vertical shaft and crosscut.

third group is Moctezuma's Daughter and extensions, showing a wide dy that has yielded high grade copper ore, mainly chalcocite and stro- ite, from the Empress of India and Queen of Sheba claims. Property eam power.

DA GOLD & COPPER MINING CO. **COLORADO.**

ead. Formerly at Salida, Chaffee Co., Colo. Described Vol. V.

DO GOLD-COPPER CO. **MEXICO.**

ffice: 824-356 South Spring St., Los Angeles, Cal. Letter returned un- d from former mine office, Alamos, Sonora, Mex. Dr. Finis E. Yoakum, ent and general manager; N. N. Dietz, secretary. Organized under laws izona, with capitalization $3,000,000, shares $1 par. Apparently is a twin s Alamos Mining & Milling Co. Lands, 30 pertenencias, in the Alamos t, said to show a 60′ vein. Stock of the company is "insured" and ranteed," hence the company is looked upon as a mere stock-jobbing e. Any stock either "guaranteed" or "insured" is dangerous, and one s both almost of a certainty must prove a very addled egg.

SBURY COPPER CO. **NORTH CAROLINA.**

ffice: P. O. Box 33, Salisbury, N. C. Mine office: Gold Hill, Rowan . C. T. B. Brown, president; W. S. Blackmer, secretary and treasurer; rd Eames, Jr., general manager. Organized 1904, under laws of Arizona, apitalization $100,000, shares $100 par.

ands, 50 acres, freehold, on the line of the Southern railway, showing d slate, carrying a fissure vein with NE. and SW. strike, formerly esti- at 15′ average width, but now estimated at 4′ width, developed by a haft, showing chalcopyrite, formerly reported as giving average assays % copper, 2 oz. silver and $5 gold per ton, but now reported to average pper and $5 gold per ton. Idle, but plans resumption and deepening to 150′.

ION RIVER MINING CO. **NEVADA.**

ine office: Contact, Elko Co., Nev. Ores carry gold, silver and copper. asoline power and a small smelter. Idle several years.

ION RIVER MINING & MILLING CO. **WASHINGTON.**

ine office: Conconully, Okanogan Co., Wash. Wm. McDaniel, manager. on Peacock Mountain, are said to give a fair showing of copper. De- ent by tunnel was planned, at last accounts.

SALTESE CONSOLIDATED COPPER MINING & MILLING CO. MONTANA.

Office: 107 Second St., Moscow, Idaho. Mine office: Saltese, Missoula Co., Mont. C. H. Williams, vice-president and manager; Fred Willard, secretary; C. B. Merwin, treasurer. Capitalization $1,500,000, shares $1 par. Lands, 9 claims, showing 3 veins, including 6 claims on Deadman's Gulch, in the St. Regis district, near the National Mining Co., 6 miles from Saltese, having a 468′ crosscut tunnel cutting a 4′ vein, with 2′ paystreak showing ore assaying up to 22.3% copper, 2.4 oz. silver and $1 gold per ton.

COMPAÑIA MINERA DE SALTILLO. MEXICO.

Office: 9a de Hidalgo, Saltillo, Coah., Mex. Letter returned unclaimed from former mine office, Concepción del Oro, El Oro, Zacatecas, Mex. Antonio Rodriguez, president; Ramón Rodriguez, manager. Property is the Jesûs Nazareno mine, having auriferous and argentiferous lead and copper sulphides. Has steam power, employing circa 150 men, and, first half of 1907, was producing, monthly, circa 1,000 metric tons of silver-lead ore, of good average tenor.

SALT LAKE COPPER CO. UTAH.

Office: 11 Broadway, New York, N. Y. Operating office: Herald Bldg., Salt Lake City, Utah. Mine office: Lucin, Box Elder Co., Utah. J. H. Sumann, president; Frederick Lewisohn, vice-president; E. C. Westervelt, treasurer; preceding officers, Adolph Lewisohn, Alfred Lewisohn, O. B. Van Sant, Andrew Sakes and J. E. Shoenberg, directors; J. Parke Channing, consulting engineer; E. G. Tuttle, superintendent. Organized circa December, 1906, under laws of Maine, with capitalization $2,200,000, shares $10 par. Debentures, $236,000, at 6%, payable only out of net earnings. Net profits, 1907, are said to have been circa $120,000.

Lands, 108 acres, on Copper Mountain, in the Newfoundland district, also 100 acres within the limits of Salt Lake City. Mine has upwards of 2 miles of workings, and was estimated, 1908, to have in sight and blocked out, 75,306 tons of copper ore of 1.1% average tenor, 27,960 tons of 3.13% average tenor, and 138,370 tons of 7.2% copper tenor. Production, 1907, was circa 24,000 tons of ore, shipped to Salt Lake smelters, yielding 2,234,446 lbs. fine copper. Property considered promising and management good.

SALT LAKE & ELY COPPER CO. NEVADA.

Office: Salt Lake City, Utah. Mine office: Ely, White Pine Co., Nev. Jas. T. Finlen, president; G. L. Rickard, vice-president; W. W. Byrne, secretary and treasurer; preceding officers, Ernest E. Campbell and John A. Kirby, directors. Organized 1906, with capitalization $5,000,000, shares $1 par. Lands, 11 claims, said to be in the vicinity of the Cumberland-Ely. Presumably idle.

SALT LAKE MINING & MILLING CO. UTAH.

Letter returned unclaimed from former office, Provo, Utah. Mine office: Callao, Juab Co., Utah. W. B. Hughes, president; D. B. Hughes, secretary and treasurer. Organized 1907, with capitalization $100,000, shares 10 cents par. Lands are in the Detroit district. Presumably idle.

COMPAÑIA MINERA SALVADORA DEL HUANACO DE TALTAL. CHILE.

Office: Iquique, Chile. Mine office: Taltal, Antofagasta, Chile. Organized March 17, 1905, under laws of Chile, with capitalization £12,000, shares £5 par.

SAMPO MINING & DEVELOPMENT CO. FINLAND.

Dead. Was succeeded, December, 1906, by Finnish American Mining Co. Formerly at Kisko, Abo, Finland. Fully described Vol. VI.

COMPAÑIA MINERA DE SAN ACASIO y ANEXAS. MEXICO.

Mine office: San Juan de Guadalupe, Durango, Mex. Property includes

Acasio and Tres Rosas mines, carrying gold and copper ores. Has wer, employing circa 50 men.

IA MINERA DE SAN ANTONIO. **MEXICO.**
. Formerly at La Cruz, Centro, Tamaulipas, Mex.

TONIO COPPER CO. **MEXICO.**
: Iron Mountain, Mich. Mine office: San Antonio de la Huerta, ora, Mex. O. C. Davidson, president; preceding officer, D. G. Kerr, Sebenius, C. D. Frazer, Col. Louis W. Powell and Richard C. Flana- tors. Organized circa October, 1908, under laws of Arizona, with tion $2,500,000, shares $10 par; issued, $2,000,000.
s, 9 groups, area circa 2,000 acres, near the Yaqui river, showing a d zone of approximately 200′ to 500′ width.
lopment, which has been in progress since circa 1906, is by tunnels, be driven to give backs of about 1,100′, and considerable ore of age copper tenor has been blocked out, ores including high grade carbonates, and sulphides of good average tenor. The management ed of strong, experienced and thoroughly capable mining men.

TONIO MINING CO. **COLORADO.**
: 312 Century Bldg., Denver, Colo. Mine office: Red Mountain, , Colo. Employs circa 50 men. M. T. Chestnut, president and gen- ger; Otto Koehler, vice-president; Wm. L. Stephens, secretary and preceding officers, E. B. Morgan and Wilbur M. Warnock, directors; Coper, mine superintendent. Organized Feb. 5, 1908, under laws of with capitalization $500,000, shares $1 par. Annual meeting, last n February.
s, 30 claims, area circa 200 acres, a 20-acre millsite and 10 acres ous lands, one mile from a railroad, in the Red Mountain district and San Juan counties. Property shows porphyry, carrying several , estimated at 20′ to 30′ width, said to be traceable more than 3,000′, y company to carry enargite averaging 12% copper, 10% lead, 10 oz. $3 gold per ton, which estimate is considered high. Development is of 37′ and 200′, and by the 200′ Koehler tunnel and 625′ Camp Robber th a total of 1,200′ of workings, reported to give 1,000 tons of ore it for stoping.
ment includes a 5-h. p. air-compressor and 3 power drills. There are uildings and dwellings. Company plans extending the Koehler tunnel l installing a more powerful mining plant.

TONIO MINING & EXPLORATION CO. **MEXICO.**
office: Tapalpa, Sayula, Jalisco, Mex. John P. Johnson, president; alez Brizuela, secretary; B. S. Dewey, treasurer. Has surface ores % copper, 750 grams silver and 15 grams gold per metric ton.

TAZAR COPPER CO. **MEXICO.**
: 508 Germania Bank Bldg., Pittsburg, Pa. Mine office: Tlacolula, lex. J. Albert McKay, president; Hon. Pembrook R. Fliteraft, vice- Oscar A. Rogers, secretary; Andrew B. Berger, treasurer; Guillermo son, general manager; Frank M. Lehmer, superintendent. Organ- 14, 1904, under laws of Maine, with capitalization $1,000,000, shares ssued, $780,000.
are several groups, area 700 acres, and a 40-acre millsite, in the Tla- rict, 8 miles south of the ruins of Mitla. Country rocks are porphyry one, carrying numerous contact veins or lenses, of which 6, under de- , are reported to have an average width of 8′, outcropping for 2 last accounts mine had a 50′ shaft, showing selected oxide and car- s of 44% copper tenor, while assays of outcrops give 1 to 15%

copper, 15 to 20 oz. silver and from nothing to 16% lead. It is planne develop mainly by tunnels. Property considered promising.

SOCIEDAD MINERA DE SAN BARTOLO. CH

Office: Santiago de Chile. Mine office: Gatico, Antofagasta, Chile. ganized Aug. 8, 1905, under laws of Chile, with capitalization £120,000, s £1 par. Lands show 5 sandstone beds carrying disseminated native co Early 1908 was building a 200-ton mill, of modern design and equipment, a view to beginning regular production on a considerable scale.

SAN BARTOLO COPPER MINES, LTD. CH

Dead. Voluntarily liquidated, 1903. Formerly at Gatico, Antofogasta,

SAN BERNARDINO COPPER CO.

Dead. West Virginia charter forfeited, 1902. Formerly in San Berna Co., Cal.

SAN BERNARDINO GOLD, COPPER & LIME CO. CALIFOR

Letter returned unclaimed from former mine office, San Bernardino Bernardino Co., Cal. F. G. Stickney, president; W. H. Miller, secretar treasurer; preceding officers, I. F. Swarthout, Sydney Swarthout and Swarthout, directors. Organized circa June, 1907, under laws of Arizona, capitalization $1,000,000. Lands, in Badger Cañon, on Little Mountain, 7 north of San Bernardino, show a body of auriferous and argentiferous ore with limestone hanging, said to be 100′ wide at point of exposure. H incline shaft and a 300′ tunnel. Idle and apparently moribund.

SAN BERNARDINO MINING CO. ME

Office and mine: Schalk Bldg., La Cananea, Arizpe, Sonora, Mex. Judd, president; J. L. Stroyick, vice-president and superintendent; J. M. general manager; B. N. Norton, consulting engineer. Organized under of United States and Mexico, with capitalization $500,000, shares $5 par.

Lands, 144 pertenencias, 18 miles southeast of Cananea, 2 miles west railroad, in the Sierra Manzanal, developed by a 100′ shaft, showing a 6′ carrying auriferous copper ores giving assays up to 30% copper, 70 oz. and $8 gold per ton. Small shipments, to El Paso smelter, netted $93 pe Was worked, circa 1876, for silver, but suspended, owing to raids of Ap Property is considered promising, but is idle.

SAN BERNARDINO MINING CO. ME

Mine office: La Cananea, Arizpe, Sonora, Mex. J. M. Gibbs, ma Property shows auriferous and argentiferous copper ore. Presumably idl

SAN BERNARDINO MINING & MILLING CO. ARIZ

Dead. Formerly at Douglas, Cochise Co., Ariz. Fully described Vol

SAN BERNARDO MINING CO. ME

Office: 920 Merchants' Loan & Trust Bldg., Chicago, Ills. Mine Aduana, Alamos, Sonora, Mex. Mine, known as the Santo Domingo, shaft sunk between two veins, known as the Balvanera and Santo Do which are expected to unite at depth. Ores give assays of 46 oz. silver, small copper and lead values. Idle and apparently moribund.

SAN BERNARDO MINING CO. ME

Mine office: Alamos, Sonora, Mex. Is the Mexican incorporation Southern Sonora Development Co., and is controlled by Sonora Central Co.

SANCA CONSOLIDATED MINING CO. ID

Office: Detroit, Mich. Mine office: Priest River, Kootenai Co., Jacob Haarer, president; Lou Burt, first vice-president; O. R. Baldwin, tary and treasurer. Organized under laws of Arizona, with capitali $3,500,000, shares $1 par.

Lands, 540 acres, in the Priest River district, in the extreme norther of Idaho, lacking rail transportation. Camp No. 1 has seven 20′ pits,

veral hundred feet of development. Camp No. 2 has several hundred feet of velopment, said to show a 35′ vein giving ore assaying well in copper, silver d gold. Camp No. 3 has eight 10′ pits. Camp No. 4 has several hundred feet crosscut tunnels, said to develop 2 veins, with a back of 600′.

AN CALLETANO MINING & SMELTING CO. **ARIZONA.**

Letter returned unclaimed from former office, 121 Geary St., San Francisco, Cal. Mine office: Calabasas, Santa Cruz Co., Ariz. Lands, 12 claims, in groups, in Santa Cruz and Pima counties, from which selected samples have ven assays up to 9% copper, 400 oz. silver and $2.50 gold per ton. Idle and parently moribund.

AN CARLOS COPPER CO. **ARIZONA.**

Dead. Lands sold to Saddle Mountain Mining Co. Formerly at Christmas, la Co., Ariz.

AN CARLOS COPPER CO. **MEXICO.**

Office: 1747-25 Broad St., New York, N. Y. Mine office: Linares, Sexto, uevo León, Mex. Works office: San José, Centro, Tamaulipas, Mex. W. H. ichols, Jr., president; S. H. Steele, secretary and treasurer; Edw. D. Self, neral manager. Organized 1896, under laws of New York, with capitalization 00,000, shares $1 par.

Mining lands, 6 square miles, are in the San Carlos district of Tamaulipas. lso owns 6,400 acres of timber lands. Has contact veins between limestone d porphyry, carrying oxide, carbonate and sulphide ores, mainly latter. Development is by upwards of 50 shafts and about 7 miles of tunnels, with total orkings of circa 10 miles. Has a 38-mile railroad connecting with the Gulf anch of the Mexican Central Railway, which, in addition to handling company's own traffic, enjoys a very satisfactory general business. Closed down, rly 1907, laying off circa 500 men.

AN CARLOS DEVELOPMENT CO. **ARIZONA.**

Office and mine: Globe, Gila Co., Ariz. W. C. Duncan, general manager. ands, known as the Cobre Verde group, include the Annie Rooney mine, once eld by the Spenazuma swindle. Has shafts of 43′ and 82′, showing 2 veins, 1 bout 3′ wide. Was developing at last accounts.

AN CRISTOBAL COPPER CO. **NEW MEXICO.**

Office: 616-116 Broad St., New York, N. Y. Mine office: Arroyo Seco, aos Co., N. M. Richard Hopkins, president; B. F. Shakespeare, secretary; . K. Turner, manager; Geo. Oates, superintendent. Organized circa 1901, as uccessor of Rio Hondo Copper Mining Co. Lands, 1,850 acres, also sundry ater-rights and a railroad franchise. Mine has an 80′ ore body, carrying opper, gold, silver and lead, opened by a 1,000′ tunnel. Is said to have bought he Hawkeye group, near Amizett, Taos county. Has a smelter and cyanide lant. Original development was for copper, but later operations have been onfined to developing a big ledge of gold-bearing quartz.

OMPAÑIA MINERA SAN DIEGO. **MEXICO.**

Letter returned unclaimed from former mine office, Parras de la Fuente, arras, Coahuila, Mex. Has auriferous and argentiferous copper ore. Idle.

AN DOMINGO GOLD & COPPER CO. **ARIZONA.**

Dead. Merged, circa 1903, in Picacho Blanco Mining Co. Formerly at forristown, Maricopa Co., Ariz.

INA SAN DOMINGOS. **PORTUGAL.**

Owned by Mason & Barry, Ltd.

AN FELIPE MINING CO. **MEXICO.**

Office: Philadelphia, Pa. Mine office: Hostotipaquillo, Ahualulco, Jalisco, lex. Col. N. Z. Seitz, president and general manager; Geo. P. Roux, superintendent. Organized 1902, under laws of Arizona, with capitalization $1,000,000, hares $1 par. Development is by a tunnel, planned to be driven 3,000′, to

cut the San Felipe veins at depths of 1,600′ and 3,200′. Has a mill, ra
50 tons daily capacity, planned to be remodeled. Paid dividends from
sales, hence is viewed with much suspicion.

COMPAÑIA MINERA DE SAN FERNANDO. ME

Mine office: Zimatlán, Oaxaca, Mex. Muñoz Gomez, manager. Has
erous copper and argentiferous lead ores, employing circa 40 men, at la
counts.

SAN FERNANDO COPPER MINING & SMELTING CO. ME

Office: 3637 Fourth St., San Diego, Cal. Mine office: Ensenada,
Baja California, Mex. F. M. Woods, president; H. E. Woods, vice-pres
Warren Woods, treasurer; E. C. Humphrey, manager.

Lands, 180 pertenencias, area 445 acres, in the San Fernando district
240 miles below the California line, 25 miles east of San Carlos Landi
the Pacific, and 80 miles southeast of the harbor of San Quintín, with
wagon road from mine to the landing. Mine, discovered by the San Fra
friars, early in the Nineteenth Century, is said to have produced upwa
$500,000, from ore shipped, via San Francisco, to Liverpool, ore rangi
high as 50% in copper tenor, with good gold and silver values. Pr
shows numerous veins of 3′ to 5′ width, carrying carbonate ores at s
changing at depth to chalcopyrite. Shipments by present owners have
aged circa 20% copper. Equipment includes a hoist, pumps and labo
Has steam power and a 50-ton smelter, employing circa 30 men at last ac

SOCIEDAD ANONIMA INDUSTRIAL DE MINAS DE COBRE (
SAN FERNANDO y SANTA ROSA.

Dead. José F. Santa Eulalia, was president. Property was the Fin
Joaquin, circa 30 miles northeast of Cienfuegos and about 12 miles w
Manicaragua. The mine, 4 miles north of the Rio Mayo, was worke
considerable scale, beginning circa 1865, and shipped, 1868, to Swansea
tons of ore of 19.7% average copper tenor. Was last worked 1883-188
pending because of a revolution. The vein ranges up to 30′ in width, ca
cuprite, melaconite, azurite and chalcopyrite. Property has been idle fo
years. Company's office formerly was at Havana, Cuba. Formerly at
Clara, Santa Clara Province, Cuba.

COMPAÑIA MINERA DE SAN FRANCISCO DEL AZUL. ME

Mine office: Matehuala, Catorce, San Luis Potosi, Mex. W. B. A. Di
manager. Property includes the San Francisco and San Miguel mines, ca
gold, silver and copper ores. Has steam power, lixiviation plant and a
mill, employing circa 100 men.

SAN FRANCISCO DEL ORO MINES, LTD. ME

Office: 65 London Wall, London, E. C., Eng. Mine office: Parral, H
Chihuahua, Mex. Earl of Denbigh, chairman; James E. Hyslop, ma
Harold A. Searle, secretary. Organized Apr. 18, 1903, under laws of
Britain, with capitalization £375,000, shares £1 par; issued, £330,000.
253 acres, 14 miles southwest of Parral, carrying gold, silver, copper, le
zinc ores, undergoing development. Shipments are made to nearby sm
and profits earned in first 18 months are given by company as in ex
£22,000. Was building a 200-ton mill, 1907.

SAN FRANCISCO MINING CO. ME

Office: care of J. G. Pritchard, vice-president and general manage
bee, Ariz. Mine office: San Felipe, Arizpe, Sonora, Mex. H. M. W
president; Fred C. Hagen, secretary; W. E. Tester, assistant secretary;
Wood, treasurer; Peter Pitz, superintendent. Organized Oct. 23, 1905,
laws of Arizona, with capitalization $60,000, shares $10 par. Lands, 16
oncins, also exploratory rights over 4 square miles of adjacent lands.

s several veins of 30″ to 9′ width, giving good assay values, mainly nd silver, with from a trace to 7.19% copper, and up to 50% lead. ly idle.

ANCISCO MINING CO. **MEXICO.**
office: Autlán, Jalisco, Mex. L. E. Fuller, president. Organized trace of operations.

ACION MINERA SAN FRANCISCO y ANEXAS. **MEXICO.**
Formerly at Asientos, Ocampo, Aguascalientes, Mex.

TIER COPPER CO. **MEXICO.**
: 800-189 La Salle St., Chicago, Ills. Mine office: San Javier, Sonora, Mex. Jacob J. Smith, president; Chas. F. Sollars, vice-presi-sley R. Perry, secretary; W. Schellinger, mine manager. Organized 7, under laws of South Dakota, with capitalization $5,000,000, shares nd is incorporated under laws of Mexico with same title. Lands, 3 groups, are said to carry high grade argentiferous copper ore. In nents, October, 1907, promised a dividend within 6 months, but appar-dend failed to materialize. Is not regarded favorably.

AN JOAQUIN. **CUBA.**
d by Sociedad Anonima Industrial de Minas de Cobre San Fernando Rosa.

N JOSÉ. **CHILE.**
and mine: care of Silva y Rivas, owners, Tamaya, Ovalle, Coquimbo, ine, opened 1844, is 517′ deep. Idle at last accounts.

É CONSOLIDATED MINING CO. **MEXICO.**
office: Moctezuma, Sonora, Mex. Organized under laws of Arizona colized in Mexico. Lands, circa 100 acres, lying near the Moctezuma ., showing a vein of 5′ to 12′ width, carrying values mainly in silver with small gold and copper values. Presumably idle.

É MINING CO. **CUBA.**
Succeeded, circa 1902, by El Cobre Mines. Formerly at El Cobre, de Cuba.

AN JOSÉ y OTRAS. **SALVADOR.**
and mines: care of Luna Hermanos, owners and managers, Melapán, a, Salvador. Has auriferous and argentiferous copper ores, with wer, and a small and antiquated smelter, employing circa 250 men, counts.

IA MINERA SAN JUAN. **MEXICO.**
office: Muleje, Sur, Baja California, Mex. Presumably idle.

N JUAN. **SPAIN.**
office: Paimogo, Huelva, Spain. D. José De Soto, manager. Lands, res, including 4 old mines. Idle.

D MINERA SAN JUAN. **CHILE.**
: Calle Prat, 55, Valparaiso, Chile. Mine office: Higuera, La Serena, , Chile. Employs 170 men. Guillermo Lyon, president; José Maria nanaging director; preceding officers, E. A. Sandiford, Ruperto nd Cirilo Armstrong, directors; Miguel Scantlebury, general manager; pargoe, mine superintendent; Ricardo Everett, smelter superintend-nized Feb. 17, 1906, under laws of Chile, with capitalization 1,000,000 300,000 pesos preferred and 700,000 pesos common shares, par 20 pesos paid in. Semi-annual meeting, March and September.
, 29 claims, area 66 hectares, also a 9-hectare millsite. Country granite and diorite, showing 8 strong parallel veins, opened by a ber of tunnels and by the following shafts: Casas, 70′; Ajo, 500′; 40′; Rosario, 300′; Cocinera, 240′; Capriciosa, 700′; San Juan, 1,200′;

lerma, 200'; San Pablo, 600'. Mines are estimated to have 20,000 tons of ore blocked out for stoping.

Mines, opened 1820, have been in continuous operation since. Power plant includes 6 hoists, good for 1,000' depth each, 7 driving engines, and a Siemens & Halske electric plant for lighting purposes and for driving 4 electric rock drills, of the same make. Buildings include a 100x100' machine-shop, a 30x30' carpenter shop and a 30x30' smithy, all of wood, and about 50 dwellings for employes.

Company has two smelters, one at Las Casas mine, and the other, which is the more important, in a valley below and about one mile distant from the mines, from which ore is received in carts. The two smelters have a combined capacity of 230 tons daily. Equipment includes 12 kiln calciners, a 120-ton rectangular blast-furnace and seven 16-ton reverberatory furnaces. Product is a matte of 50% average copper tenor, sent to the works of the Sociedad Chilena de Fundiciones, at Guayacán, for refining. Nearest shipping point is the port of Potoralillo, distant 9 miles from the smelter. Fuel is soft coal, costing 30 pesos per ton, and coke, costing 35 pesos per ton, Chilean. Average cost of mining is 3 pesos per long ton, and of smelting, 10 pesos per ton. Ores treated average 8% copper. Production, first 5 months of 1906, was circa 1,000 tons fine copper, and for 1907 is estimated at 4,000,000 lbs. fine copper.

SAN JUAN BAUTISTA MINING CO. MEXICO.

Office: 513 Ouray Bldg., Washington, D. C. Mine office: Moctezuma, Sonora, Mex. Dr. F. S. Chamberlain, president; A. G. Drake, secretary and manager; Wm. Carter, treasurer; Geo. F. Woodward, general manager; Wm. M. Reese, superintendent; A. J. Klide, assistant superintendent. Organized March, 1906, under laws of Arizona, with capitalization $5,000,000, shares $10 par.

Lands, 19 claims, on El Cerro Rosario, including antiguas showing large slag piles remaining from ancient smelting operations. Property carries a mineralized zone circa 1,000' wide, traceable about 1,500', between limestone and porphyry. Development is by a 2-compartment 100' shaft on the Rosario claim, also shafts of 50' and 126' on other claims. La Bronzosa mine carries argentite, stephanite and chalcopyrite, associated with pyrite, and La Cobriza mine is said to show 30' of ore carrying highly argentiferous cuprite. Property has yielded ores assaying up to $300 gold per ton.

MINA SAN JUAN DE MALAJA. CUBA.

Mine office: Santa Clara, Santa Clara, Cuba. Lands, 6 miles northeast of Santa Clara, showing a 100' gossan, are but slightly developed, and have been idle many years.

SAN JUAN MINING CO. COLORADO.

Mine office: Central City, Gilpin Co., Colo. Ores carry gold, silver and copper. Has steam power. Presumably idle.

SAN JUAN SMELTING & REFINING CO. COLORADO.

Office: Exchange Bldg., Denver, Colo. Letter returned unclaimed from former mine office, Silverton, San Juan Co., Colo. Wm. Oliver, president; W. F. Kendrick, vice-president; John B. Humphrey, secretary; preceding officers Wm. F. Ford, John Colquhoun, Geo. P. Peck, C. I. Gagnier and John M. Braley directors; Samuel H. Dresbach, superintendent.

Organized 1903, under laws of Colorado, with capitalization $3,000,000, shares $1 par, as a consolidation of Kendrick & Gelder Smelting Co., Oliver Mining Co. and Paradox Copper-Gold Mining Co. Bonds, $250,000 authorized, issued, circa $100,000. Interest rate on bonds is variously reported as 6% and 10%. In March, 1907, was offering $100,000 of 10% bonds, at par. On 27, 1908, authorized an issue of $300,000 ten-year refunding bonds, secured by mortgage, but a shareholder secured a court order prevent issue of these bonds, because property was in hands of a receiver wh

authorized, illegally. Interest on the $100,000 bond issue was de-
arch 1, 1908, and receivers appointed, the foreclosure proceedings
reason of default in interest apparently being in the nature of a
ction, at the start, but becoming unfriendly later on. At last
June, 1908, property was held, under tax-title, by E. C. Drew, as

, circa 40 claims, 10 patented, including a millsite one mile below the
mine, lying mainly on Eureka Mountain, with 3 claims in Cinnamon
the line of the Silverton, Gladstone & Northern Railroad, 7 to 10
Silverton. Part of company's former landed holdings were under
ease, partly paid, to Ross Mining & Milling Co., at last accounts.
rincipal property is the Henrietta mine, carrying auriferous and
ous copper ores, opened by a long crosscut tunnel, estimated by
o show circa 400,000 tons of ore, of about $15 average value, blocked
traction, which figures are considered exaggerations. The Henrietta
show occasional chutes of high grade smelting ores, up to 20 and
pper tenor, with smelting ore averaging about 7% in copper tenor,
g ore averaging circa 3.5% copper. The mine has gasoline and elec-
.
melter, said to have been renovated, 1905-1906, is held under bond
by Ross Mining & Milling Co. The reduction plant included a 400-ton
or and 200-ton smelter. The Henrietta mine does not seem to impress
at Silverton as an especially remarkable property, and the com-
exceptionally bad shape, with every prospect of a total smash.

AS COPPER CO. **MEXICO.**

office: Choix, Fuerte, Sinaloa, Mex. Entire stock issue is owned
istral Copper Co.

A MINERA SAN LUIS. **MEXICO.**

Formerly at Tepezalá, Ocampo, Aguascalientes, Mex.

S MINING CO. **MEXICO.**

1104-27 William St., New York, N. Y. Mine office: Gabriel,
Mex. John G. Gibbons, president; W. J. Robinson, vice-president;
Martin, secretary and treasurer; Col. Britton Davis, managing
preceding officers, Seymour W. Tulloch, Angel L. Negrete, J. Edward
ilter S. Perry and Hollister S. Logan, directors.
ized Nov. 16, 1900, under laws of West Virginia, and capitalization
1905, to $3,000,000, shares $1 par. First dividend, 1%, was paid
1906, and a second dividend was paid July, 1906, both unearned.
eting, second Wednesday in April.
, 506 pertenencias, area 1,241 acres, in 64 groups, also a 25-acre mill-
e San Lucas and Pánuco de Coronado districts of Durango. Com-
claims to hold El Cura ranch, area 35,000 acres.
ineral property shows limestone and porphyry, carrying fissure veins
t deposits, company reporting 64 ore bodies, of which 6, under de-
, were estimated, by company, to average 3% copper, 12% lead, 1%
z. silver and $4 gold per ton, mainly from sulphide ores, the com-
ing, at end of 1905, to have 17,314′ of workings estimated to show
ns of ore, with 200,000 tons blocked out, which figures are not
because of the phenomenal untruthfulness of some of its officers.
were discovered circa A. D. 1650, and worked, more or less irregu-
1830, when closed, on account of water and Indian troubles, remain-
until reopened, 1901, by present company.
an Luis mine shows a considerable body of copper ore, of low average
some high-grade silver ore.

The Potosina mine, with 1,994′ of workings, is said to show, at the w end, a considerable body of ore of smelting grade, and a large quant milling ore.

The San Gonzalo mine, 350′ deep, shows low-grade ores, carrying s silver values above, with copper on the lower levels.

The Castillana mine, adjoining the San Gonzalo on the east, with t tinuation of the vein of the latter, is said to have been proven for a dis of 1,600′, by trenches and pits of 10′ to 60′ depth, and has an idle 120′ s

The Sidney mine has a shallow shaft, showing a 2′ vein of galena, g assays up to 45% lead, 40 oz. silver and 3 grams gold per ton, but has idle for some years, on account of a heavy inflow of water.

The San Lucás mine, area 19 hectares, 35 miles northwest of Gabri an old property, claimed to have nearly 2 miles of workings, carrying m lead and zinc.

The Aventura mine, adjoining the San Lucás, shows a heavy go with an old shaft opening a 3′ vein of carbonate ore, said to give assay 32% copper and 12 grams gold per ton.

The San Pablo mine shows parallel veins said to carry 6″ to 36″ streaks of sulphide ore, giving assays up to 16% copper, 360 oz. silver an grams gold per ton. Development is by an abandoned incline shaft, a 175′ vertical shaft, latter equipped with gallows-frame and hoist.

Equipment includes steam plants, said to aggregate 750 h. p., with 6 b and 2 Ingersoll-Sergeant air-compressors, of 12 drills combined capacity.

Buildings are said to include a 25x150′ stone machine-shop, 25x150′ wo carpenter-shop, stone smithy, offices, 4 general stores and a large numbe dwellings for workmen, with a total of 175 buildings.

The 60x180′ mill, of adobe and iron, is equipped with 2 crushers, 1 jig 4 Bartlett tables. Concentration seems to have proven more satisfactory leaching.

The Trinidad leaching mill, of 120 tons claimed daily capacity, h calcining furnaces, for roasting ore before leaching, and apparently tr only about 40 tons daily, when in operation.

Production, 1905, was reported as 30,725 tons of ore, of which 5,845 were shipped to smelters, 6,481 tons were leached, and 15,118 tons were centrated. Production, 1905, was reported as circa 450,000 lbs. fine copper net earnings, 1905, were claimed to be 277,530 pesos.

John G. Gibbons, a director, brought suit, 1907, in the Supreme Cou Mexico, to recover $500,000, alleged to have been lost or wasted by the "Gen." Walter S. Logan, a notorious shyster lawyer, who died July 19, the title boasted by the "general" having been acquired as former pre of the "Sons of the American Revolution," which is greatly to the cre that body of patriots, who permitted their ancestors to bleed for the ca liberty. The suit of Mr. Gibbons includes proceedings against Myra B. M and the Logan Estate, also including Hon. Geo. B. Agnew and Col. B Davis.

The debts of the company were claimed, in 1905, to have been paid withstanding which the capitalization of the company was increased, an payment of dividends begun, simultaneously with the selling of treasury which was a deliberate and intentional swindle on the part of the ma ment, which has been connected with some of the most notorious mining f dividends of fabulous size, and Miss Martin and the balance of her gan of the United States, including the George A. Treadwell and Copete comp The company promised, over the name of the notorious Myra B. M accuse Louis Ross, formerly general manager in Mexico, of bad manag and making misleading reports that caused the company to pay divi

a matter of fact, Mr. Ross is one of the few honest men ever connected ially with this company, and his management, instead of being bad, was ptionally good—in fact, his conduct of the company's mining affairs was nexpectedly capable that the Logan gang, which obviously started the San s as a mere bit of stock-jobbery, came to the conclusion that the mine valuable, hence wrecked the company, in accordance with the piratical hods employed by this outfit in all of its mining deals.

Despite the efforts of Mr. Ross and a few other honest men, the company rowed money, 1906, or at least is supposed to have borrowed money, accord- to the records, from some of the parties connected with the outfit, and ber, 1908, judgment was taken, by default, for $51,000, in favor of Hon. . B. Agnew, on 2 notes, made 1906, running for 18 months, payable to Myra Martin.

The newspapers that accepted the putrid advertising of this rotten con-, well knowing it to be a swindle, are now foremost in their denunciations he company, there being no further revenue derivable from the printing he company's lies. Property considered valuable, but the company is a dle.

T MARCUS-SALOME DEVELOPMENT CO. **ARIZONA.**

Office: Pittsburg, Pa. Mine office: Salome, Yuma Co., Ariz. Lands are t 4 miles from the Socorro mines, in the Harqua Hala Mountains. Pre- ably idle.

MPAÑIA MINERA SAN MARTIN y ANEXAS, S. A. **MEXICO.**

Office: Oaxaca, Mex. Mine office: San Martín de los Cansecos, Oaxaca, x. Employs 124 men. Frank M. Leonard, president and general manager; is Acevedo, vice-president; Ranulfo Bravo, secretary, treasurer and superin- dent; Jesús Linares, mine superintendent. Organized Jan. 15, 1907, under s of Mexico, with capitalization 400,000 pesos, shares 10 pesos par, in 35,000 paid shares and 5,000 assessable shares; issued, 37,995 shares.

Lands, 5 groups, area 55 hectares, circa 10 miles from Ocotlán, including antigua said to have been worked by Aztecs before the Spanish conquest. perty shows diorite, carrying a vein of 10' to 12' average width, traceable mile, with strike of 11° West, carrying ore returning, from shipments, 2% per, 2% lead, 6% zinc, 5 kgs. silver and 100 grams gold per metric ton. Equip- t includes a mill, built by former owner, having 3 stamps and 3 Wilfley les, now idle because of poor location. Property, in development stage, ported itself from sales of shipping ore, and company has no indebtedness. perty considered promising and management good.

NA SAN MIGUEL. **PERÚ.**

Mine office: Morococha, Junín, Perú. Mine has 2 tunnels, lower circa meters in length, developing mainly enargite, with some tetrahderite and ttle tennantite, associated with pyrite. Mine, opened 1894, in 10 years duced, from ore averaging 20% copper and 333 grams silver per ton, 6,400 kgs. fine copper and 10,794 kgs. fine silver. Mine was said, 1905, to producing about 800 tons monthly, of ore averaging circa 22% copper and oz. silver per ton. Production, 1907, estimated at 1,400,000 lbs. fine copper.

GOCIACION MINERA SAN MIGUEL. **MEXICO.**

Mine office: Matehuala, Catorce, San Luís Potosí, Mex. Wm. R. Boggs, general manager. Has argentiferous copper ore and gold. Equipment in- les steam power and a 100-ton leaching plant. Employs circa 300 men.

CIEDAD DE MINERALES DE SAN MIGUEL. **SPAIN.**

Dead. Was succeeded, Oct. 12, 1904, by San Miguel Copper Mines, Ltd. merly at Almonáster, Huelva, Spain.

SAN MIGUEL COPPER CO. NEW M

Mine office: Tecolote, San Miguel Co., N. M. Frank J. Buck, tendent, at last accounts. Presumably idle.

SAN MIGUEL COPPER MINES, LTD.

Office: 23 Queen Victoria St., London, E. C., Eng. Mine offic monáster, Huelva, Spain. H. Schmidtz, chairman; Geo. Emdin, secretary; E. Eberbach, managing director; F. O. Harvey, consulting engineer. ized Oct. 12, 1904, under laws of Great Britain, with capitalization £ shares £1 par; issued, £140,007. A former debenture issue, of £75,000, was fully redeemed from the share premium on a new stock issue, 1905, at £2 10s. per share. Company is said to have a reserve fund of Regular dividend rate is 25% per annum, paid quarterly.

Lands, 1,900 acres, including the San Miguel and adjoining mines of erous pyrites. The property was worked, for some years, by a Por company, the Sociedad de Minerales de San Miguel, until taken over by present owners. In 1907 the lower levels of the mine caved in, since time production has been limited to open-cast ore extraction. The prope circa 450,000 tons of partly leached ore, on surface, in teleras and terer the mine was said to show circa 500,000 long tons of ore averaging 2.5 per, before underground workings were lost, in whole or part, by caving

Property includes a 19-kilometer private railway, costing £40,000 the mine, at Almonáster, to El Cerro, where connection is secured w Ferrocarril Zafra y Huelva.

Production, 1904, was 588 long tons precipitate and 18,487 long tons erous pyrites, with copper contents of 1,612,800 lbs. fine copper. Pro 1905, was 933 tons precipitate and 3,168 tons cupriferous pyrites, bu was only 797,440 lbs. fine copper, owing to mine troubles, and, because troubles, management was changed, 1907.

SOCIEDAD MINEIRA DE SAN MIGUEL DE HUELVA.

Dead. Succeeded, Oct. 12, 1904, by San Miguel Copper Mines, Lt merly at Almonáster, Huelva, Spain.

COMPAÑIA MINERA DE SAN MIGUELITO. M

Mine office: Cumpas, Moctezuma, Sonora, Mexico. Long idle.

COMPAÑIA MINERA SAN PABLO. M

Mine office: San Pedro de las Colonias, Parras, Coahuila, Mex Cuyas, superintendent. Has gold, silver and copper ores, employing circa

SOCIÉTÉ ANONYME DES MINES DE SAN PEDRO.

Office: 39 Rue de Chateaudun, Paris, France. Mine office: Zala Real, Huelva, Spain. Don Carlos Marchal, agent. Capitalization, francs. Lands include the Barranco de los Buyes group of 10 old min 167 hectares. Idle.

SAN PEDRO COPPER CO. NEW M

Mine office: San Pedro, Santa Fé Co., N. M. Idle since circa 1899

SAN PEDRO COPPER CO., S. A. M

Mine office: La Cananea, Arizpe, Sonora, Mex. Is controlled, stock ownership, by Cananea Central Copper Co., which is a subsidi poration of the Greene Cananea Copper Co. Property consists of the can, Copper Belt, Bryan, Seguro, Square and eastern part of Massey N El Oriente claims. Property is described under title of Greene Canan per Co.

COMPAÑIA MINERA SAN PEDRO DE NOLASCO.

Mine office: San Pedro de Nolasco, Victoria, Santiago, Chile. is the Carlotta mine, opened A. D. 1795, which is developed by a 700' Presumably idle.

)MPAGNIE DES MINES DE CUIVRE DE SAN PLATON. **FRANCE.**

Office: 7 Rue Pillet-Will, Paris, France. Mine office: Almonáster, Huelva, ain. Guillermo Sundheim, manager. Organized Oct. 18, 1906, under laws France, with capitalization 3,000,000 francs, shares 100 francs par. In 1907 t earnings were 393,568 francs, 69 centimes, and, with allowance for amorti- tion, there was left a net balance of 238,211 francs, 16 centimes. Paid 5% vidends in 1907 and 1908.

Lands, 46 hectares, including the San Platon, Segunda San Platon and mento de San Platon mines. Production, 1907, was 26,116 metric tons of priferous pyrites.

AN POIL MINING & EXPLORATION CO. **WASHINGTON.**

Office: care of S. L. Boyer, manager, Spokane, Wash. Mine office: Re- blic, Ferry Co., Wash. Organized 1907, under laws of Washington. Lands e 9 groups of claims, carrying gold and copper ores.

AN RAFAEL COPPER MINING CO. **MEXICO.**

Office: Cleveland, Ohio. Mine office: Terrazas, Chihuahua, Mex. R. B. tchinson, manager; Capt. M. D. Murray, superintendent. Supposedly is ntrolled by the firm of Corrigan, McKinney & Co. Lands, known as the lumbia group, formerly were held by Federal Copper Co., of El Paso, and agoon Mining Co.

AN RAFAEL COPPER MINING CO. **MEXICO.**

Dead. Formerly at Hermosillo, Sonora, Mex. Described Vol. VI.

AN RAFAEL MINING CO. **MEXICO.**

Dead. Succeeded by Mercer-San Rafael Mining Co. Formerly at Ameca, lisco, Mex.

)MPAÑIA MINERA SAN RAMÓN DE FREIRINA. **CHILE.**

Office: Santiago de Chile. Mine office: San Juan, Freirina, Atacama, ile. Organized Nov. 22, 1904, under laws of Chile, with capitalization 160,000 sos, shares 100 pesos par.

AN REMO COPPER CO. **ARIZONA.**

Dead. Was merely a ghost, when in existence. Formerly haunted Gleeson, chise Co., Ariz. Described Vol. V.

AN SIMON COPPER CO. **ARIZONA.**

Office: Marquette, Mich. Mine office: Paradise, Cochise Co., Ariz. athan M. Kaufman, president; Hon. Norman W. Haire, vice-president; S. R. aufman, secretary and treasurer; preceding officers, Thos. F. Cole, John A. ncan, W. G. Rice and Thos. H. Collins, directors; Marshall Estes, superin- ndent. Organized circa January, 1907, under laws of Arizona, with capitali- tion $2,500,000, shares, $10 par, as a reconstruction of Chiricahua Develop- nt Co.

Lands, 40 claims, area circa 750 acres, 16 miles from nearest railway, at deo, taken over, April, 1903, by predecessor of present company, and pre- ously operated by Capt. Thos. Burns as a silver mine. Has a 750′ crosscut nnel, with a 100′ winze 700′ from portal, cutting circa 50′ of leached ore, parently the apex of a sulphide ore body. The 400′ Mars shaft, sunk on a in having a 150′ gossan, passed through leached ore, and is bottomed in alcopyrite of 2 to 4% copper tenor. The 400′ Planet shaft has drifts on the urth level. Equipment includes two 150-h. p. boilers, two 2,000′ Lake Shore uble-drum hoists, and a 16-drill Sullivan air-compressor. Has several mine ildings. Management is good. Practically idle, except for annual assess- nt work.

ANTA ANA-ARIZONA MINING CO. **ARIZONA.**

Office: P. O. Box 1715, Bisbee, Ariz. Mine office: Middlemarch, Cochise ., Ariz. A. W. McPherson, president; Geo. H. Neale, vice-president; A. F. ressler, secretary and treasurer; Wm. Goar, general manager; preceding

officers and E. J. Bennett, directors. Organized April, 1906, under law Arizona, with capitalization $2,500,000, shares $1 par; issued, $1,400,000. nual meeting, second Tuesday in February.

Lands, 14 claims, unpatented, area 280 acres, on Dragoon Mountain, in Black Diamond district, 8 miles from Southern Pacific railway, at Pe showing limestone and porphyry, with 5 ore bodies, of which 2, under velopment, show argentiferous carbonates and sulphides, latter mainly ch pyrite, estimated by company to carry an average of 10% copper, 15% and 6 oz. silver per ton. Development is by tunnels of 70′ and 80′, and shafts of 56′, 110′ and 300′.

Property has steam power, with a 10-h. p. hoist, good for 500′ depth, 2 buildings. Company plans continuous development.

SANTA CASILDA COPPER CO. MEX

Letter returned unclaimed from former mine office, La Lombardia, U pán, Michoacán, Mex. Hon. M. G. Horner, president; R. A. Mills, secret preceding officers, Rafael R. Velad, Pablo Kosidowsky and Alberto Worm, di tors. Organized under laws of Mexico, with capitalization 1,500,000 p Lands are well watered, and include a concession for development of hydraulic horse power from a near-by river. Oxidized zone is superficial, phide zone carrying mainly chalcopyrite. Mine is developing consider bodies of 5% concentrating ore, and has small quantities of ore of 15 to copper tenor. Is said to plan a 200-ton concentrator.

SANTA CRUZ COPPER CO. MEX

Mine office: Santa Cruz, Magdalena, Sonora, Mex. Idle and appare moribund.

SANTA CRUZ MINING CO. ARIZO

Office: 51st St. and Allegheny River, Pittsburg, Pa. Mine office: P gonia, Santa Cruz Co., Ariz. W. W. Hall, president; W. B. Barnes, vice-p dent; R. D. McDonald, secretary; Wm. M. Schwartz, general manager; J Tustin, superintendent. Organized Oct. 5, 1901, under laws of Arizona, capitalization $1,000,000, shares $1 par.

Lands, 6 claims, area 124 acres, 2 miles east of Patagonia, in the Har district, showing several fissure veins, of about 20′ average width, said to a general average assay of 8.5% copper, 20 oz. silver, 5% nickel and $25 per ton, mainly from chalcocite. Development is by 2 shafts, deepest circa

SANTA EMILIA COPPER CO. MEX

Office: 69 Wall St., New York, N. Y. Mine office: Coapa, Michoa Mex. John A. Kennedy, president; A. J. Peyton, vice-president and ge manager; Manual L. Ward, secretary and treasurer; J. R. Crum, superint ent. Organized 1899, under laws of Delaware, with capitalization $1,000 and reorganized, March 27, 1905, under laws of Maine, with capitaliz $2,000,000, shares $1 par. Of the increased capitalization, $500,000 was g shareholders, as a stock dividend, and balance placed in the treasury, going to the general manager for lands turned in by him. Is contr through ownership of majority of stock, by Mexican Development Co.

Lands, 113 acres, in the Tacambaro district, 24 miles from Mexican tional Railway and circa 40 miles southwest of Morelia, including a 30 property, adjoining the original tract, taken over from the general man and former president, paid for in shares from the new treasury stock.

The mine is developed by the 1,200′ Napoleon tunnel, and by a 625′ compartment shaft. The property is said to have circa 3,000′ of workings management is said to plan deepening shaft to 1,000′ and crosscutting, 800′, to intercept the Guadalupe vein. At last accounts the mines ha shown ore in payable quantities, but the management was said to conside situation encouraging.

La Lolita, La Viola and Santa Clara, located in the San Blas mountains of the Sierra Madre, midway between and 25 miles from the Mexican Central and Sierra Madre Pacifico railways. Principal development is on La Lolita group, which has shafts of 75′ and 150′, showing rich oxidized ores, assaying up to 70% copper, shipments from which have averaged 15% copper.

SOCIEDAD MINERA SANTA RITA DE ARQUEROS. CHILE.

Office: Santiago de Chile. Mine office: Arqueros, Coquimbo, Chile. Organized Dec. 12, 1905, under laws of Chile, with capitalization 400,000 pesos, shares 50 pesos par.

SANTA RITA COPPER MINING & SMELTING CO. ARIZONA.

Letter returned unclaimed from former office, 1509 Chemical Bldg., St. Louis, Mo. Mine office: Arivaca, Pima Co., Ariz. Geo. P. Meyers, R. J. Adams and C. T. Sharn, vice-presidents; N. C. Wilson, secretary; J. M. Wyatt, treasurer; C. F. Elliott, general manager. Organized June, 1901, under laws of Arizona, with capitalization $3,000,000, shares $1 par.

Lands, 40 claims, area 630 acres, also 4 timber claims and a 20-acre smeltersite, in the Tyndall district, Santa Rita Mountains, 13 miles from Arivaca, said to show 10 veins, of which 4, under development, are claimed to average 8′ to 30′ in width, and are claimed to give average assays of circa 18% copper, 6 to 10% lead, 1 to 3% zinc, 40 to 68 oz. silver and $2 to $8 gold per ton, from sulphide ores, these figures being utterly preposterous. Mine has 5 pits and shafts, of 20′ to 110′ depth, and 5 tunnels, of 40′ to 260′ length, with circa 1,000′ of workings. Company changed officers repeatedly, was a mere stock-jobbing scheme under former managements, and is regarded with suspicion.

SANTA RITA MINING CO. NEW MEXICO.

Office: 85 Ames Bldg., Boston, Mass. Mine office: Santa Rita, Grant Co., N. M. Albert C. Burrage, president; B. B. Thayer, consulting engineer; John Deegan, superintendent. Capitalization $5,000,000, shares $25 par. Is said to contemplate reduction of capitalization to $2,000,000. Paid, 1904, a $100,000 dividend.

Lands, 79 claims, 46 patented, area circa 640 acres. Is the oldest copper mine in New Mexico, and one of the oldest in the United States, having been opened A. D. 1800. Mine was abandoned, circa 1820, owing to the Mexican revolution, and was reopened, circa 1860. Development is by numerous shallow shafts. No. 8 shaft, with two compartments, is 214′ deep, carrying stopes on 5 drifts. No. 9, a 2-compartment shaft, started 1906, is to be sunk to 300′. A new shaft, of 1,000′ projected depth, was started 1907. Equipment includes a 100-ton concentrator, having rolls and Wilfley tables.

Company is exceedingly secretive, for reasons best known to the management, and is supposed to be closely allied with the Amalgamated Copper Co. Production, 1907, is estimated at 2,500,000 lbs. fine copper, largely secured by leasers.

COMPAÑIA MINERA SANTA ROSA. CHILE.

Office: Santiago de Chile. Mine office: Arqueros, Coquimbo, Chile. Organized May 29, 1905, under laws of Chile, with capitalization 200,000 pesos, shares 1,000 pesos par.

SANTA ROSA COPPER CO. ARIZONA.

Dead. Lands sold, circa 1905, to Detroit Copper Mining Co., of Arizona. Formerly at Metcalf, Graham Co., Ariz. Described Vol. V.

SANTA ROSA DEVELOPMENT CO. MEXICO.

Dead. Lands sold, 1907, to Cabullona Development Co. Formerly at Fronteras, Arizpe, Sonora, Mex. Described Vol. VI.

SANTA ROSA DE MAZAPIL MINING CO. MEXICO.

Letter returned unclaimed from former office, 20 Broad St. New York.

Mine office: Mazapil, Zacatecas, Mex. Has gold, silver, lead and copper pened by shafts and a 1,500′ tunnel. Presumably idle.

A ROSALÍA MINING CO. **MEXICO.**

ine office: Tejupilco, Temascaltepec, Mexico, Mex. Property carries rous and argentiferous copper and lead ores, and has steam power, em- g, 1906, circa 40 men.

TIAGO CONSOLIDATED MINING, MILLING & TUNNEL CO. **COLORADO.**

ine office: Georgetown, Clear Creek Co., Colo. S. K. Davis, superin- nt, at last accounts. Has gold, silver, lead and copper ores, and a 75-ton ntrator.

TIAGO COPPER MINING CO. **CUBA.**

)ead. Formerly at El Cobre, Santiago de Cuba.

TIAGO MINING CO. **MEXICO.**

)ffice: 517 Francis St., St. Joseph, Mo. Mine office: Parral, Hidalgo, ahua, Mex. Geo. J. Greene, president; Geo. Roche, vice-president; T. G. s, secretary and treasurer; Nat P. Wilson, general manager; preceding s and Henry Roach, directors. Organized March 7, 1907, under laws of na, with capitalization $1,000,000, shares $1 par. Annual meeting, third day in February.

ands, 6 claims, area 79 acres; also 1 claim, area 20 acres, in Otero county, Mexico. Chihuahua lands show limestone and porphyry, carrying bodies, said to be fissure veins of 12′ average width, giving average of 3.5% copper, 15% lead, 22 to 25 oz. silver and $6 gold per ton, from and sulphide ores. Has 7 shafts, of 55′ to 150′ depth, with total of 755′ rkings, estimated to show 150,000 tons of ore blocked out for stoping, is excessive. Has a 250-h. p. electric plant, with 3 hoists, good for each, 7-drill air-compressor, 60x85′ machine-shop of frame and adobe, ther mine buildings. Plans building a concentrator. Employs circa n.

O DOMINGO GOLD & COPPER CO. **SANTO DOMINGO.**

ine office: San Cristobal, Santo Domingo. Sly Dorsey, vice-president; 'Connor, secretary; E. F. Buchanan, treasurer. Organized Sept. 17, 1906, laws of Maine, with capitalization $64,000,000, shares $100 par.

ands claimed are alleged mining rights to 400 square miles of the Jaina , in the Province of San Cristobal, estimated, with due modesty, by the ny, to carry seven billion dollars' worth of gold, to be had for merely g it out. Notwithstanding the alleged possession of $7,000,000,000 worth d, the property was bought for $50,000 and the company spent only) for development and equipment, never employing more than 10 men. . O. Brown & Co., stock brokers of New York, voluntarily redeemed a erable portion of the stock of this company placed by them, with the ation that they had learned that the property was not as represented, ere considered entitled to commendation for an honest act, but this iled, under discreditable circumstances, a few months later, and appar- Brown & Co. refunded but part of the money, as shareholders instituted circa October, 1908, for restitution of $543,000, alleged to have been or stock. Peter Whitney, former president of the company, apparently ot responsible for the company's misrepresentations, and is said to be f a sufferer, but apparently Whitney was mixed up very closely with f the peculiar transactions of A. O. Brown & Co. The company is a , and, to all practical intents and purposes, is dead.

O DOMINGO SYNDICATE. **SANTO DOMINGO & HAITI.**

ice: care of E. A. Blanton, Jr., general manager, The Bourse, Philadel- a. Mine office: San Cristobal, Santo Domingo. Capt. J. R. De Lamar,

E. P. Earle, G. P. Lindermann, L. H. Taylor, Jr., W. T. White, Geo. R. T. C. Hall and E. T. Lavino, directors. Organized under laws of New with capitalization $100,000.

Lands, 100 square miles, in the republics of Haiti and Santo D The San Francisco Hills mine, near San Cristobal, is said by Mr. Bl show a body of chalcopyrite of 500′ width, carrying 5 to 20% copper, to $12.50 gold per ton. A 42″ gauge railway was under constructio 1906. Presumably idle.

SOCIÉTÉ ANONYME DES MINES ET USINES DE SANTOMERA.

Office: 27 Rue Mogador, Paris, France. Mine office: Santomera, Spain. A. Foques-Duparc, J. Foques-Duparc, J. L. Baille and R. C Chizy, directors. Organized May 2, 1905, under laws of France, with c zation 300,000 francs, shares 500 francs par. Was endeavoring, July, reorganize, with capitalization 1,100,000 francs, shares 100 francs par.

SANTO NIÑO MINING CO. M

Dead. Formerly at Symón, San Juan de Guadalupe, Durango, Mex.

SAN XAVIER COPPER CO. M

Office: care of Wm. Foster, secretary, Tucson, Ariz. Mine office Javier, Hermosillo, Sonora, Mex. C. C. Rountree, president; George vice-president; Max Muller, treasurer. Organized under laws of Arizon capitalization $1,000,000, shares $1 par. Mexican incorporation is th pañía Minera de Cerro Verde, S. A. Lands, 1,440 pertenencias, 80 mil of La Colorada, also 300 pertenencias lying 24 miles to the southwar circa 4 miles north of the Yaqui river. Presumably idle.

SAPHO MINING CO. NE

Mine office: Ely, White Pine Co., Nev. John Webber, superint Capitalization $1,000,000, shares $1 par. Development is by a tunnel, a back of 250′ at last accounts, said to show auriferous oxidized ores a 6 to 22% copper, with a paystreak carrying about $30 gold per ton steam power.

SARATOGA DEVELOPMENT CO. COLO

Mine office: Central City, Gilpin Co., Colo. John Owen, manager gold, silver and copper ores, with steam power. Was developing, wit 15 men, at last accounts.

SARATOGA PYRITIC SMELTING CO. COLO

Dead. Formerly at Ironton, Ouray Co., Colo. Described Vol. VI.

SARATOGA SMELTING & REFINING CO. COLO

Dead. Succeeded, 1903, by Continental Smelting & Refining Co merly at Ironton, Ouray Co., Colo.

SASAGATINI MINE. J

Mine office: Hatazako-mura, Kanoashi-gori, Iwami, Japan. P carries slightly argentiferous chalcopyrite, associated with sphalerite, and arsenopyrite, with quartz and limestone gangue, in numerous conta ranging up to 50′ in width. Production has been as follows: 274,412 copper and 62,961 momme silver in 1900; 324,183 lbs. copper in 1903; lbs. copper and 109,215 momme silver in 1907.

SASCO SMELTER. AR

Owned by Southern Arizona Smelting Co.

SATER COPPER CO. NEW M

Dead. Lands sold under foreclosure Dec. 12, 1906. Practically su by Fort Pitt Copper Co. Formerly at Kenton, Oklahoma, with lands in Co., N. M. Fully described Vol. VI.

SAUK RIVER MINING CO. WASHIN

Letter returned unclaimed from former office, 327 Pacific Blk.,

ish. Mine office: Darrington, Snohomish Co., Wash. Harold G. Price, president and treasurer; Wm. Van Waters, secretary. Organized 1898, under laws Washington, with capitalization $200,000, shares 50 cents par. Lands, 9 ims, area 180 acres, in three groups, carrying 3 veins of auriferous and ntiferous copper ore. Vein at Blue Bird group is claimed to be 98′ wide, ween porphyry and slate, carrying 3 paystreaks, of 2′, 4′ and 6′, balance of being a low-grade self-fluxing concentrating ore. Idle several years and arently moribund.

ULT GRAY COPPER CO. **ONTARIO.**

Dead. Absorbed, circa 1903, by Copper Queen Mining Co., Ltd. Formerly Bruce Mines, Algoma, Ont.

ULT PROSPECTING & DEVELOPMENT CO. **ONTARIO.**

Dead. Succeeded, circa 1903, by Copper Queen Mining Co., Ltd. Formerly Bruce Mines, Algoma, Ont.

UX HEAD COPPER MINING CO., LTD. **MICHIGAN.**

Office: 36 Home Bank Bldg., Detroit, Mich. Mine office: Marquette, arquette Co., Mich. Employs 8 men. Chas. A. Stringer, president and general manager; Frank M. Moore, vice-president; J. G. Krieg, secretary; Chas. Miller, treasurer; preceding officers and Geo. R. Purdon, directors. Organized Aug. 13, 1902, under laws of Michigan, with capitalization $2,500,000, ares $25 par. Lands, 360 acres, freehold, in the Sauk's Head district, northest of Marquette, 2 miles from Lake Superior & Ishpeming railway, showing ore bodies, said by company to occur as impregnations in granite and diorite, at stated by other authorities to be gash veins in granite, these ranging 4′ 8′ in average width, giving assays of 1 to 4% copper and $2 to $200 gold r ton. Has shafts of 50′ and 170′, and tunnels of 30′, 40′ and 70′. Has eam power with 2 donkey hoists, a 5-drill Ingersoll air-compressor and 4 wer drills. Has 7 buildings, including a 15x20′ machine-shop, store, office d dwellings. Idle.

AVAGE GOLD & COPPER CO. **ARIZONA.**

Office: 625 Noble St., Chicago, Ills. Operating office: Douglas, Ariz. ine office: Paradise, Cochise Co., Ariz. F. M. Wajtalewicz, president; J. A. wandowski, vice-president; P. Dryzmalski, secretary; A. P. Behnke, treasr; preceding officers, J. Kosinski, A. Spetz, J. Z. Wierzchowski, A. Czajor, C. Hess, Jr., and Albert Hindera, directors; Jas. Reay, general manager. anized Jan. 6, 1904, under laws of Arizona, with capitalization $3,000,000, res $1 par. Annual meeting, first Tuesday in November.

Lands, 53 claims, area circa 1,000 acres, in the California district, lying the eastern foothills of the Chiricahua Mountains, next the San Simon ley, 10 miles from Rodeo, the nearest railroad station. The property shows irregular ore bodies, apparently lenses, of which 4, under development, are 2′ to 36′ width, giving assays of 5% copper, 1% lead and from nothing to oz. silver per ton, lead values being from occasional galena.

Development is by 5 shafts, mainly shallow, the 710′ Snowball incline ft showing an ore body ranging up to 23′ in width. There also is a 350′ nel, with circa 3,000′ of workings.

Equipment includes a 60-h. p. Otto gasoline engine and a 75-kw. electric erator, 2 motors, an electric hoist and electric drills.

A much-talked-of 50-ton smelter failed to materialize, though it was said, one time, that the material therefor was on the ground. Company was d, January, 1908, to plan beginning shipments to the Copper Queen smelter.

VANIC MINE. **ARIZONA.**

Office: care of Col. H. L. Pickett, St. George, Utah. Is a partly developed e, in the northern part of Mohave county, Arizona, nearest town being

St. George. Has shipped 14 carloads of ore to Salt Lake smelters, aver 39% copper, this being hauled 140 miles by wagon and 300 miles by Property is promising, but almost inaccessible, at present. Idle several

SAVANNA COPPER CO. NEW ME

Office: 616 Lonsdale Bldg., Duluth, Minn. Mine office: Tyrone, Co., N. M. Works office: Silver City, Grant Co., N. M. H. B. Hovland, eral manager; E. A. Wayne, superintendent. Organized circa September, under laws of Arizona, with capitalization $2,000,000, shares $10 par, merger of the Copper Gulf and Comanche companies, properties of whi separately described, under their respective titles, in this work. Propert sidered valuable and management good.

SAWATARI MINE. JA

Owned by Mitsu Bishi Goshi-Kwaisha.

SCANLAND MINE. ARIZ

Office and mine: Paradise, Cochise Co., Ariz. F. S. Douglas, general ager; L. H. Scanland, mine superintendent and owner. Lands, 12 clai patented, area 240 acres, also a 10-acre millsite, in the California di showing limestone, quartzite and porphyry, with 4 ore bodies, of 4' width, of which one, under development, traceable circa 4,500', carries oxides and carbonates, but mainly chalcopyrite, galena and sphalerite mated to average 5% copper, 20% lead and 23% zinc, with a trace of Development is by a 175' shaft and 450' tunnel, with circa 700' of wo Idle, except for annual assessment work.

SCANTIC GOLD MINING & MILLING CO. COLORADO & ME

Office: 206 Continental Bldg., St. Louis, Mo. Mine offices: White Hinsdale Co., Colo., and Charcas, Moctezuma, San Luis Potosí, Mex. Leschen, president; A. D. Grant, secretary. W. F. Smith, superintend Colorado property, which has steam power, and is developing ores of silver, copper and lead. Joseph T. Murphy, manager of Mexican pr which includes the San Sebastian and extensions, carrying silver, lea copper, equipped with a 25-ton concentrator.

KUPFERKIESBERGBAU SCHATTBERG. AUS

Mine office: Schattberg, Tyrol, Austria. Was a very small copp ducer at last accounts.

GEWERKSCHAFT SCHLESISCHE NICKELWERKE. GERM

Dead. Formerly at Gläsendorf, Schlesien, Germany. Described V

SCHULL COPPER MINING CO., LTD. IRE

Office: 16 Great Winchester St., London, E. C., Eng. Mine office: County Cork, Ire. Thos. V. Anthony, W. F. Ladenburg, and Sir Thos. Tancred, Bart., directors; W. S. Pearless, mine manager; F. C. Vernon, tary. Organized Apr. 6, 1906, under laws of Great Britain, with capital £9,000, in 5,000 ordinary shares of £1 par, and 40,000 deferred shares of Property is a 60-year mining license, dated Dec. 25, 1902, covering la Coney Island and Long Island, said to have been bought for a considera £3,500. Is not regarded favorably.

SCHUYLER COPPER CO. PENNSYLV

Mine office: Phoenixville, Chester Co., Pa. Property is the Jones in Caernarvon township, Berks county, Pennsylvania. Company o the mine, 1869-1878, and built a small smelter. Idle since 1878.

SCHULYKILL COPPER CO. ARI

Dead. Formerly at Chloride, Mohave Co., Ariz.

SCOTIA MINING & MILLING CO. WASHIN

Dead. Formerly at Bossburg, Stevens Co., Wash.

SCOTTISH-AUSTRALIAN COPPER CORPORATION, LTD.

Office: Guernsey, Great Britain. Organized Jan. 14, 1904, under laws of Guernsey, with capitalization £200,000, shares £1 par. Location of lands, if any, unknown. Not regarded favorably.

SCOTTISH-CAUCASIAN COPPER SYNDICATE, LTD.

Dead. Formerly had an office at 55 West Regent St., Glasgow, Scotland.

SCOTTISH CHIEF MINE. **UTAH.**

Mine office: Park City, Summit Co., Utah. Wm. J. Lawrence, manager. Mine, opened by a 325' shaft, shows mainly silver-lead ores, assaying up to 60% lead and 21 oz. silver per ton, but has made several small shipments of ore averaging circa 14% copper and 20 to 50 oz. silver per ton, and has ores assaying 7.5% copper, 6% lead, 32 oz. silver and $1.80 gold per ton.

SCOTTISH COPPER MINES SYNDICATE OF BRITISH COLUMBIA, LTD. **BRITISH COLUMBIA.**

Dead. Formerly at Kamloops, Yale district, B. C.

SEABOARD COPPER CO. **VIRGINIA.**

Office: 77 South Market St., Boston, Mass. Mine office: Virgilina, Halifax Co., Va. M. A. Packard, president; H. J. Sampson, vice-president; Edward L. Pond, secretary; C. C. Merritt, treasurer; L. W. Tucker, general manager. Organized July, 1902, under laws of New Jersey, with capitalization $300,000, shares $1 par. Lands, 135 acres, including the Dorothy and Bailey mines, in the Virgilina district, 3 miles from the Southern Railroad, showing slate, traversed by a fissure vein of 8' estimated width, carrying cuprite, malachite and azurite in the upper part, with bornite below, giving estimated values of 3 to 4% copper, with combined gold and silver values of $1 to $1.20 per ton. Development is by shafts of 30', 265' and 115', and by 2 tunnels, of 165' each, with a total of 840' of underground workings, estimated to show 40,000 tons of ore, with 10,000 tons blocked out for stoping, and with 3,000 tons on the dumps, ready for milling. Equipment includes a 275-h. p. steam plant, with a 25-h. p. Lidgerwood hoist, good for 500' depth, and a 5-drill Ingersoll-Sergeant air-compressor. Buildings include an office, bunk-house and engine-house. Idle several years.

SEAGER-CORYELL GOLD & SILVER MINING CO., LTD. **IDAHO.**

Office: Phillipsburg, N. J. Mine office: Custer, Custer Co., Idaho. John Eilenberg, president; Reginald Coryell, secretary and general manager. Organized January, 1900, under laws of New Jersey, with capitalization $100,000, shares $1 par. Lands, 9 claims, area 170 acres, in the Yankee Fork district, showing several veins, with about 1,500' of underground openings, one claim showing melaconite, azurite, malachite and chalcopyrite, assaying 3% copper, with fair gold and silver values. Idle several years.

SEA ISLAND COPPER CO. **ALASKA.**

Mine office: Kasaan, Alaska. F. A. Barrette, superintendent. Lands, 6 claims, about 1 mile from the Rush-Brown property, on Kasaan Bay, showing chalcopyrite assaying up to 20% copper.

SEARCHLIGHT COPPER-GOLD MINING CO. **NEVADA.**

Office: 402 Stimson Bldg., Los Angeles, Cal. Mine office: Searchlight, Lincoln Co., Nev. Samuel T. Graham, president; R. P. Pierce, vice-president; John G. Davis, treasurer; V. A. Brewer, secretary; preceding officers, Robt. D. Reed, J. W. Cornick and C. Rauber, directors; John Howe, superintendent. Organized Nov. 27, 1901, under laws of Arizona, with capitalization $1,000,000, shares $1 par; issued, $880,000. Annual meeting, first Monday in November.

Lands, 7 claims, surveyed for patent, area 140 acres, showing 6 ore bodies, in granite and porphyry, of which 3, under development, of 6" to 5' width, carry oxidized and sulphide ores estimated to average 12.8% copper and up to

$140 gold per ton. Development is by the 100′ Oom Paul shaft, and by tunnels of 20′, 35′ and 100′. Hand power is employed. Old management hit badly by the property, but new directorate seems an improvement.

SEARCHLIGHT GOLD & COPPER CO. ARIZONA.

Dead. Property was 11 claims and water rights, in the Wrightson district, circa 2 miles west of Patagonia, on the Sonora Railroad. Lands showed a mineralized dyke of 250′ claimed width, with a capping of hematite and manganese, opened by three 40′ shafts, said to give ore assaying $4 to $10 per ton in combined gold and silver values. M. S. Moore was superintendent. Formerly at Patagonia, Santa Cruz Co., Ariz.

SEATON MINING & MILLING CO. COLORADO.

Dead. Formerly at Idaho Springs, Clear Creek Co., Colo.

SEATTLE-ALASKA COPPER CO. ALASKA.

Office: Seattle, Wash. Mine office: Latouche, Latouche Island, Alaska. Jas. Bjorn, secretary, treasurer and general manager. Capitalization $1,000,000, shares $1 par. Lands, 10 claims, with a water power available, said to give a fair surface showing of argentiferous and auriferous chalcopyrite, having a 65′ shaft in ore. Has steam power and employs circa 15 men.

SEATTLE-BOSTON COPPER CO. WASHINGTON.

Office: 419 Alaska Bldg., Seattle, Wash. Mine office: Skyhomish, King Co., Wash. Chas. E. Crane, president and general manager; Dr. F. A. Churchill, vice-president; Geo. H. Law, secretary; Martin B. Crane, treasurer; preceding officers and A. M. Brooks, directors; A. J. Walters, superintendent; Jas. Cosgrove, mine superintendent. Organized Sept. 19, 1905, under laws of Washington, with capitalization $2,000,000, shares $1 par, divided into $600,000 preferred 8% stock and $1,400,000 common stock, latter issued in payment for the property, and held in escrow at last accounts, 1906.

Company apparently controls the Dutch Miller Mining & Smelting Co., through lease, and creditors of latter asked, 1907, for a receiver, alleging mismanagement on the part of officers of the Seattle-Boston Copper Co.

Lands, 20 claims, area 400 acres, also a 120-acre millsite, in the Burn district, 11 miles south of the Great Northern Railway. A water-right, owned by the company, is claimed to be capable of developing 40,000 h. p. Property shows syenite, carrying 12 fissure veins, of which 3, under development, are reported as of 18′ average width, opened by tunnels of 70′, 35′ and 60′, estimated to show 20,000 tons of ore, with 5,000 tons blocked out for stoping, which figures are considered excessive, in view of the extremely limited development secured, with 1,500 tons of ore on the dump, formerly estimated to carry average values of 16% copper, 3% zinc, 6 oz. silver and $3 gold per ton, which figures are considered excessive, but ore was said, February, 1907, to average only about 7% copper and 4 to 11 oz. silver per ton, with small gold values, which figures probably are amply high.

Improvements include 5 small mine buildings, and company was said, 1906, to have ordered a 500-ton Bleichert aërial tramway, a 250-kw. Westinghouse electric generator, a 100-h. p. hoist and a 10-drill air-compressor, but none of this machinery seems to have materialized. Company also reported that it was building a 6½-mile private line, to be known as the Seattle-Boston Railroad, to have a 200-h. p. Westinghouse electric locomotive, but apparently was unable to sell sufficient stock to build the road. The property may be valuable, as claimed, but the company cannot be regarded favorably, in the light of excessive claims made at the time when stock was being sold. Presumably idle.

SEATTLE GOLD & COPPER MINING CO.

Dead. Formerly had an office at Seattle, Wash.

T COPPER MINING CO., N. L. **AUSTRALIA.**
ne office: Illewong, N. S. W., Australia. Organized December, 1907, aws of New South Wales, with capitalization £1,200, shares £10 par.

IA COPPER CO. **COLORADO.**
ne office: Salida, Chaffee Co., Colo. Capitalization is 90,000 shares, of 75,000 shares are under option, and in escrow, at $2 per share, until 909. Lands are leased for 10 years to Salida Gold & Copper Mining tion presumably is to Shawmut Consolidated Copper Co.

TÉ ANONYME DES MINES DE CUIVRE DU SEIBAL. **BRAZIL.**
ice: 40 Rue de Chabrol, Paris, France. Mine office: Camaquam, Caca-Rio Grande do Sul, Brazil. Al. Fluert, president. Organized May 5, nder laws of France, with capitalization 415,000 francs, shares 100 par. Property, near the Camaquam mine, carries argentiferous and ous copper ore, and associated minerals.

I COPPER SYNDICATE, LTD. **TRANSVAAL.**
tter returned unclaimed from former office, Johannesburg, Transvaal. ed August, 1907, under laws of Transvaal, with capitalization £3,000. n of lands, if any, unknown. Apparently moribund.

SMELTING & LEAD CO. **CALIFORNIA.**
ice: Merchants Exchange Bldg., San Francisco, Cal. Works office: Contra Costa Co., Cal. A. J. Ralston, president; Eugene E. Braden, sident and general manager; H. B. Underhill, Jr., secretary; Alfred Ropp, superintendent. Organized 1875, under laws of California, and rolled, through stock ownership, secured 1905, by American Smelters es Co., a subsidiary corporation of the American Smelting & Refining e works represent an investment of about $4,000,000.

perty consists of an extensive smelting and refining plant, equipped am and electric power, at Vallejo Junction, near Carquinez Strait, the the smelter being somewhat circumscribed. Ore is received by rail ter, the works drawing supplies from all of the Pacific states, with a portion of the ore supply coming from Nevada and California.

works include a 400-ton smelter, with both lead and copper stacks, n lead refinery, a refinery for parting gold and silver, and a plant for ufacture of bluestone. Fuel is coal, coke and petroleum.

injunction was secured, 1907, by the authorities of Solano county, of damage to agricultural interests from smelter smoke, which the y endeavored to do away with, by installing a fume precipitation n the Cottrell system, said to have been used successfully elsewhere, as planned to eliminate dust and carbon and sulphur compounds, in- sulphurous acid and sulphur anhydride, this process including the in- n of a sulphuric acid plant. Notwithstanding the attempts of the to do away with fumes, the efforts were not entirely successful, and ks were closed, August, 1908, by a permanent injunction, and appar- e out of business permanently, to the great detriment of the mining s of California and Nevada.

K MOTHER-LODE COPPER MINES, LTD. **BRITISH COLUMBIA.**
d. Formerly had an office at 5 Laurence Pountney Hill, London, E. C.,

LE COPPER MINING CO. **GEORGIA.**
d. Property sold, 1904, by the sheriff, to Carl Henrich, for $33,000. lly succeeded by Lincoln Gold & Copper Mining Co. Formerly at le, Wilkes Co., Ga. Fully described Vol. III.

LE MINE. **GEORGIA.**
ed by Lincoln Gold & Copper Mining Co.

SEMINOLE MINING CO. UT

Office: 208-69 East Third South St., Salt Lake City, Utah. Mine office: Ca Juab Co., Utah. Clyde H. Wilson, president; W. F. Wilson, vice-presid Frank L. Wilson, secretary and treasurer; preceding officers, W. R. Wilson N. R. Wilson, directors. Organized, circa 1907, under laws of Utah, with talization $125,000, shares 25 cents par. Lands, in the Clifton district, the Lucy L. Mining & Milling Co., are said to show ores carrying copper, si gold, lead, tin and nickel.

SENATOR MINES CO. COLORA

Office: 1209 Association Bldg., Chicago, Ills. Mine office: Black H Gilpin Co., Colo. Chas. Kingsley Ray, president; John G. McConnell, president; Dr. M. H. Brown, secretary; W. J. Blake, superintendent; pr ing officers and H. A. Hicks, directors. Organized 1906, under laws of rado, with capitalization $1,500,000, shares $1 par. Lands, 2 claims, havi 550′ shaft with about 2,000′ of workings, showing veins of 5′ to 7′ width, a 2′ paystreak, carrying mainly ore of concentrating grade, with valu silver, copper and gold, mainly the latter. Has a hoist good for 1,500′, plans an electric power installation.

SENECA MINING CO. MICHI

Office: 301-199 Washington St., Boston, Mass. Operating office: H ton, Mich. Mine office: Allouez, Keweenaw Co., Mich. Albert S. Big president; Wm. J. Ladd, secretary and treasurer; Hon. Norman W. general manager; S. Russell Smith, superintendent. Organized circa under laws of Michigan, with capitalization $500,000, shares $25 par.

Lands originally were 3,240 acres, reduced, 1880, by setting off Ahmeek, to 1,880 acres. The tract, which is just north of the Mohawk Ahmeek mines, is very irregular and somewhat awkward in outline, he covered with drift, and a considerable portion is swampy. Lands carr Calumet, Kearsarge and Allouez conglomerates, and the Osceola and Kear amygdaloidal beds, dependence being placed mainly on the latter, of the tract carries about 1¾ miles of the strike, the bed outcropping o northeastern corner of the lands. Property is served by the Keweenaw C Railway.

A little exploratory work was done, 1865, on the Kearsarge conglom and again, 1880, when 2 shafts were sunk thereon, to a depth of circ each, but work was abandoned, and this part of the tract was set off, Ahmeek.

Diamond drilling, begun 1907, will require several seasons to give a plete cross-section of the property, operations having been started on the western part of the tract. The diamond drill borings are said to have good cores, and some trenching was done, a test-pit being bottomed, D ber, 1907, in the ledge.

No. 1 shaft, started July, 1908, is located about 3,000′ north of shaft of the Gratiot mine, and is of 3 compartment size, sunk 60′ in the wall of the Kearsarge amygdaloid, which, where exposed, carries e This shaft, circa 175′ deep at the end of 1908, is concreted through overburden, with an anchorage of 44′ in the rock, giving 58′ of co from the collar, and is perfectly water-tight against surface seepage. shaft-rockhouse has an 18x24″ crusher.

There is room on the tract for a second shaft, on the outcrop Kearsarge lode, but this amygdaloidal bed must be reached, on the b of the property, by vertical shafts, unless adjoining lands carrying th crop are secured.

Equipment includes a small power plant building having a 15-dri

r, a Lake Shore duplex hoist, good for 1,500′ depth, and a locomotive ıiler. Buildings include a boarding-house and bunk-house. Property l very promising.

A SENZA. **ANGOLA.**

office: Senza do Itombe, Angola. Lands, 2 kilometers from Senza e and 192 kilometers from Loanda, show a 5-meter bed of calcareous , dipping at about 20°, said to carry about 5% copper. Idle at last

D MINERA LA SERENA. **CHILE.**

office: Higuera, La Serena, Coquimbo, Chile. Presumably idle.

O GOLD & COPPER MINING CO. **MEXICO.**

: Main St., Danville, Pa. Letter returned unclaimed from former e, La Cananea, Arizpe, Sonora, Mex. J. X. Grier, president; C. E. ıretary; M. I. Low, treasurer; D. H. Collins, general manager. Organ- ıary, 1903, under laws of Arizona, with capitalization $2,000,000, par. Lands, 112 pertenencias, south of Cananea, carrying auriferous es. Idle.

ANO COPPER CO., LTD. **ITALY.**

. Was a Guernsey promotion, formed to operate in Italy.

DEVILS MINING & DEVELOPMENT CO. **IDAHO.**

. Formerly at Weiser, Washington Co., Idaho.

; SULPHUR & COPPER CO., LTD. **SPAIN.**

: 30 George Square, Glasgow, Scotland. Operating office: Patio ras, Sevilla, Spain. Mine office: Aznalcóllar, Sevilla, Spain. Jas. rman; John Munro, secretary; John S. Macdougall, general manager; ndrew, mine manager. Organized August, 1877, under laws of Great ith capitalization £120,000, shares £10 par.

s, at the eastern end of the Sierra Morena, in the province of Sevilla, ı pyrites having good values in both copper and silver. Property worked, by present company, for many years, with marked success. n was 2,867,200 lbs. fine copper in 1905; 4,569,600 lbs. in 1906, and lbs. in 1907.

R COPPER MINING CO., LTD. **BRITISH COLUMBIA.**

: 41 John Dalton St., Manchester, Eng. H. J. Challoner, secretary. June 25, 1900, under laws of Great Britain, with capitalization ares 5s. par, to acquire copper properties at Seymour Narrows, Van- and, British Columbia. Moribund.

R MINING CO. **COLORADO.**

: 1 Broadway, New York, N. Y. Mine office: Idaho Springs, Clear , Idaho. Employs 20 men. Thos. Peyton, president; M. S. Peyton, lent; Chas. D. Ross, secretary and treasurer; Arthur H. Roller, gen- ger; Edmund Leet, mine superintendent; F. L. Stout, mill superin- Organized 1880, under laws of New York, with capitalization shares $100 par.

s carry auriferous and argentiferous copper ores, values apparently nly in gold. There is an 80-ton mill having 20 gravity stamps, and includes steam and electric power.

ÜRGSKI WORKS. **RUSSIA.**

and works: Tiflis, Russia. A. A. Broli, owner and manager. Prop- des sundry small copper mines and a small smelter in Transcaucasia. about 150,000 lbs. fine copper yearly, at last accounts.

CK COPPER CO. **NEW MEXICO.**

r returned unclaimed from former mine office, Nogal, Lincoln Co., . A. McIvers, who died May 8, 1908, was manager. Lands, 7 miles

...contact vein of 27' estimated width, between por... ...paystreak of about 4' average width, carrying cu... ...giving assays of 20% copper, 8 oz. silver and ... ...porphyry wall carrying copper impregnations. Idle

...MINING SYNDICATE. **AUSTRA...**

...Robinson Co., N. S. W., Australia. Has a 72' s...

... COPPER CO. **ARIZ...**

... St., Boston, Mass. Mine office: Clifton, Gra... ...Employs 900 men. Nathan L. Amster, president; A. B. Cl... ...David A. Ellis, secretary; R. Townsend McKeever, treas... ...Wm. A. Paine, B. Hochschild, Col. Chas. Hayden, Archi... ...and Jas. Virdin, directors; C. R. Jeffers, assistant secretary and t... ...general manager; H. H. Dyer, superintendent; Rol...

...Nov. 13, 1899, under laws of Delaware, with capitaliz... ...shares $10 par. Bonds, originally $600,000, at 7%, reduced, ...to $179,000. Company has a sinking fund of $60,000 annually, ...Boston Safe Deposit & Trust Co., transfer agent. Nat... ...Boston, registrar. Has 4,620 shareholders. Shares are l... ...Stock Exchange. Annual meeting, third Wednesday in ...

...controls the Coronado Mining Co., through ownership of ... ...and held the property 4 years, under a lease expiring O... ...Company was said, 1906, to have taken a $1,500,000 bond and lea... ...of the Copper Belle Mining Co., of Gleason, Cochise Co., Ar... ...sold, 1907, was bid in by interests closely connected wit...

...claims, area circa 400 acres, at Metcalf, in the Greenle... ...Company formerly held 400 acres in mill and smelter sites, but a 30... ...adjoining the smelter, was sold, 1907, to Arizona Copper Co., ...also owns limestone claims, on the Frisco river. The co... ...agreement with the Arizona Copper Co., Ltd., by which ... ...are mutually waived, obviating all possibility of future ...

...between limestone and porphyry, under heavy gossans of ... ...the oxidized ores favoring the limestone, while ores ... ...are mainly silicious sulphides, latter predominating. T... ...in very irregular deposits, some up to 300' in the greatest dim... ...of the ore bodies are large, and while the ore is low in grad... ...the quantity is very great, and it is probable that the ore bodi... ...considerably deeper than once thought, as it was believed, until re... ...did not continue workable below the 400' level, below which so... ...copper tenor was found, 1908. The mine shows oxide and car... ...to 10% copper tenor, in the upper levels, and sulphide ores of 3... ...in the lower workings, the sulphide ores being mainly chalcopyrit... ...chalcocite. The mine, as a whole, is deficient in sulphide or... ...one-third of the production is silicious ore, too low in grade to ... ...highly oxidized to concentrate well.

Development is by shafts, tunnels and open pits, underground w... ...a depth of 1,100' below the crest of the mountain. The mi... ...miles of workings, with considerable ore reserves, the Little Co... ...showing ore of 3 to 5% copper tenor, while the Hanson tunnel ...

show an ore body of 180′ width, averaging up to 6% copper. Considerable uble has been had from caving ground, and it was planned, 1906, giving a al to the caving system of mining. The property is timbered with 12x12" uare sets. In addition to underground workings, there are 4 open pits, giv- cheap extraction, some of the open-cuts showing iron ore, carrying an erage of 2.5% copper, available for fluxing silicious sulphides produced from derground workings. Extraction is by 2 double-track working tunnels, of ich one is7x8′ in size, connecting with a 1,400′ double-track incline tram, ding to the Coronado Railroad, with 6 ore-bins at either end, the tramway ving an incline of 36°. The incline has 10-ton cars, operated in counter- lance, with a retarding engine, the steel cable passing around a 13′ double um at the top, which runs a small air-compressor that generates power, while rving as an auxiliary brake.

Petroleum has been subsituted for coal, wherever possible, about the mine d works. The company maintains general stores at Morenci and Clifton, d owns a number of dwellings for employes.

Freight charges are about 35 cents per ton on ore from the mine to the ll, and the company plans building a 10-mile standand gauge railroad, to known as the Shannon & Arizona, to handle its own ore. The surveys have en made for this new high-line railway, which it is planned to complete at cost of $400,000, with an estimated saving of about $80,000 yearly, on ore ansportation, the company planning to issue bonds and keep the stock of e railway. The new line, in addition to the saving in freight charges, will ve immunity from the annual floods, which now cause yearly suspension shipments, for indefinite periods, with consequent heavy damage. The com- ny also is said to have secured a controlling interest, 1908, in the Clifton orthern Railway.

The concentrator, on the San Francisco river, 8 miles from the mine, is of el, in 2 connected sections, the 64x95′ upper section having a 9x15" Blake usher at the ore-bin, Huntington mills and a 220′ Robins belt conveyer, ommels and jigs. The 57x144′ lower section has 33 Frue vanners, 1 Wilfley d 2 Standard tables. The 32x50′ steel power-house has two 250-h. p. Stirling ater-tube boilers, and a 300-h. p. Nordberg tandem compound engine. Water taken from wells near the river by a 600-gallon electric triplex pump. The oncentrator treats about 400 tons of ore daily, this averaging 3.5 to 5.5% opper, and puts about 5 into 1, effecting a saving of about 75% of contained alues. In 1906 tailings carried up to 1.2% copper, due to highly oxidized ondition of ores, but tailings are being stored and may be leached later. ormerly there was much trouble from acid waters eating the iron screens, hile brass or copper screens in the jigs were worn out too rapidly, by abra- ion. This trouble was overcome by a simple but ingenious application of the rinciple of electrolysis, a low-voltage electric current being applied to the igs, by which the screen became a cathode in the circuit. This attracted ydrogen from the water, which in turn attacked the metallic salts, and the opper freed was deposited on that portion of the screens formerly eaten away.

The smelter, at Clifton, 7 miles from the mines, designed originally for 5 urnaces, had two 350-ton water-jacket blast-furnaces, each 42x170" at the uyeres. These 2 furnaces were thrown into one large furnace by a new sec- ion between, built on the plan first used at the Washoe works, making a ingle blast furnace of 1,000 tons daily capacity, which is the largest in rizona. Above the charging floor are 23 ore-bins, each 20x20x16′, with hutes. Fumes from the blast-furnace pass through a 10′ dust-flue to a 0x20x100′ dust-chamber with hopper bottom, discharging dust periodically nto cars on a railroad track in a tunnel beneath, fumes passing from the

dust-chamber, through a 170′ flue, to a 150′ steel smokestack. Slag losses are said to be only 0.515%. Slags are handled by an electric locomotive. The converter plant, added 1906, has 2 stands, making blister copper. The briquetting plant, for flue dust and fines, has a daily capacity of 60 tons, and there is a small sampling mill, in connection with the smelter.

A 60x80′ powerhouse, of steel on stone foundations, has a 300-h. p. tandem compound condensing engine, direct-connected to blowers, and converter blast is supplied by a 250-h. p. Nordberg air-compressor.

Production has been as follows: 11,899,920 lbs. fine copper in 190 11,027,453 lbs. in 1905; 11,892,960 lbs. in 1906; 10,874,619 lbs. fine copper 35,491 oz. silver and 1,250 oz. gold in 1907. For fiscal year ending Aug. 3 1907, production was 13,418,126 lbs. fine copper, 94,745 oz. silver and 1,2 oz. gold, from 211,857 tons of ore smelted, giving an average extraction of lbs. fine copper per ton, in addition to which circa 2,600,000 lbs. fine copp were produced from 15,338 tons of custom ore smelted. For fiscal year end Aug. 31, 1908, production was 15,207,768 lbs, fine copper, from 281,449 tons ore smelted, giving an average extraction of 53.4 lbs. fine copper per ton, addition to 1,458,000 lbs. fine copper produced from custom ores smelted. P duction, October, 1908, was 1,636,000 lbs. fine copper. Costs, as figured company, were 13.46 cents per pound for fiscal year 1906, 13 cents per pou for fiscal year 1907, and only 11.09 cents per pound for fiscal year 1908.

For fiscal year ending Aug. 31, 1908, receipts were $2,249,294 from copp $63,508 from silver and $33,626 from gold, with operating expenses $2,574,191, leaving a net profit of $88,841, compared with net profits $695,916 for fiscal year 1907 and $333,324 for fiscal year 1906. The comp ended the fiscal year 1907 with quick assets of $424,744, and current liabili of $197,407, giving excess of quick assets of $227,337. The property is valua and well managed, and made a better record, during the period of depress than the average of copper producers.

SHASTA COPPER CO. CALIFORN

Office and mine: 502 California St., Redding, Cal. J. W. Girdner, pr dent; Simeon D. Furber, secretary; Sherman P. White, treasurer. Organi Apr. 20, 1907, under laws of Arizona, with capitalization $1,000,000, shares par. Lands, 2 groups, including the Pit River group of 25 claims, circ mile south of Heroult, showing a good gossan, and the Arizona Consolida group, 25 claims, 4 miles from Redding, formerly worked for placer gold, sh ing a mineralized zone of circa 600′ width, carrying auriferous and argenti ous copper ores of low average tenor.

SHASTA COPPER MINING CO. CALIFORN

Dead. Formerly at Shasta, Shasta Co., Cal.

SHASTA GOLD & COPPER CO. CALIFORN

Dead. Was a stock-jobbing scheme promoted by "Baron" W. E. Johannsen. Formerly at Redding, Shasta Co., Cal. Described Vol. VI.

SHASTA-KENNETT COPPER CO. CALIFORN

Mine office: Kennett, Shasta Co., Cal. Organized 1907, under laws Colorado, with capitalization $2,500,000, by W. R. Girdner, M. J. Jordan L. E. Dabold. Lands, near Kennett, have a 600′ tunnel, showing considera bodies of low to medium grade copper ore.

SHASTA MAY BLOSSOM COPPER CO., CONSOLIDATED. CALIFORN

Office: 6-410 Kearny St., San Francisco, Cal. Mine office: Winth Shasta Co., Cal. Morton Lindley, president; Lucius A. Booth, vice-presid S. Peter, secretary and treasurer; Sumner S. Smith, superintendent. Or ized 1903, under laws of Arizona, with capitalization $10,000,000, shares par, as a reconstruction of Shasta May Blossom Mining & Smelting Co.

nds, 18 claims, area 300 acres, 800′ from holdings of the Bully Hill, in tsburg or Copper City district, circa 37 miles northeast of Redding, miles from Terry, the nearest railroad point. Property shows promterops, the main outerop being said to be traceable 500′, along a slate olite contact, carrying ore said to give assays of 6% copper and circa per ton combined gold and silver values. Property shows 5 or more deposits, having porphyritic footwalls and slate hangings. The middle nging 5′ to 40′ in width, and said to be traceable 9,000′, carries chalbornite and chalcopyrite, and is opened by tunnels of 200′, 300′ and th circa 1,500′ of workings, showing a considerable body of sulphide fair average tenor. The west vein is said to be 40′ wide.
ipment includes an air-compressor and there is a 20x90′ machine-shop ther mine buildings.

A MAY BLOSSOM MINING & SMELTING CO. CALIFORNIA.
d. Reorganized, 1903, as Shasta May Blossom Copper Co., Consoli- Formerly at Winthrop, Shasta Co., Cal.

UCK-ARIZONA COPPER CO. ARIZONA.
ce: Duluth, Minn. Mine office: Bisbee, Cochise Co., Ariz. Employs men. Thos. Bardon, president; A. Guthrie, vice-president; Archibald holm, secretary and treasurer; Lemuel C. Shattuck, managing director; g officers and Martin Pattison, directors; Jos. Walker, superintendent; Houle, consulting engineer. Organized March, 1904, under laws of ta, with capitalization $3,500,000, shares $10 par. Is closely connected, rship and management, with Denn-Arizona Mining Co. Annual meetd Saturday in February.
ds, 6 claims, patented, area 120 acres, bought for $1,022,500, lying in theastern portion of the Bisbee camp, about one-half mile from the workings of the Copper Queen, and to the north of the Calumet &

property shows Carboniferous limestone, with intrusive porphyry d a big fault, covered with a silicious iron capping of 30′ to 50′ width. o the rugged typography of the lands tunnelling is impracticable, ing properties holding all tunnel sites, hence development is by shaft. perty has large bodies of oxidized and sulphide ores, apparently averto 6% copper tenor, with much ore of better grade, ores carrying up silver and $3 gold per ton.
elopment is by a 935′ shaft, enlarged, 1906, to 3 compartments, ′ in size, connected underground with the Cuprite shaft of the Copper The shaft was damaged somewhat, late 1907, by fire, but was promptly ed. The mine has about 18,000′ of workings, with much ore available action, principal ore bodies being developed on the 700′ and 800′ levels. ber, 1908, a large and promising ore body, of medium copper tenor, ountered on the 500′ level, about 400′ from the shaft. The 600′ level 60′ body of oxidized ore, said to average about 9% copper tenor. The l has large ore bodies developed, and the 800′ level has an ore body, stope, circa 100x300′ in size, this level showing much high grade ore, siderable native copper. The 900′ level shows a considerable body of ore, of about 4% copper tenor. Mining work was begun August, l ore shipments were begun September, 1906.
pment includes a 600-h. p. steam plant, with 5 boilers, 9-drill Ingerant, 6-drill straight-line Sullivan and 25-drill Sullivan cross-compound ressors. There are 6x10″ and 10x30″ auxiliary hoists, and an Allis- duplex double-drum hoist, working under 125 lbs. steam pressure, of handling, continuously, a 15,000-lb. unbalanced load, at a vertical

hoisting speed of 2,000′ per minute, having two 7′ drums, each carryin of 1⅛″ round steel cable. Fuel is petroleum, with a normal yearly c tion of 2,500 barrels.

There are 10 mine buildings, including a 16x24′ carpenter-shop, smithy, boiler-house, engine-house and warehouse, and a changing-hou accommodations for 200 men.

Property is served by the El Paso & Southwestern Railway, and 500-ton aërial tram of 2,300′ length, with an average grade of 18′ ported by 14 towers, of 12′ to 40′ height, built of 12″ timber, set on c foundations, the tram leading from the shaft to a 1,000-ton shipping the El Paso & Southwestern railway.

The smelter site, at Douglas, 26 miles from the mine, is just s the Calumet & Arizona smelter and west of the Copper Queen work water supply available from artesian wells. The company has mad for a 1,000-ton smelter with 2 blast-furnaces, to cost about $400,000, tain strong interests in the company, being desirous that smelting be d the Copper Queen, have held up the construction of the plant.

Production was begun Aug. 28, 1906, and ended Nov. 7, 1907, on of the refusal of the Copper Queen to take custom ore, but daily shi of 75 to 100 tons, to the Copper Queen smelter, were resumed Dec. 1 For a time during 1907 the mine shipped about 400 tons of ore daily half oxidized ores and half sulphides, former going to the Douglass and latter to Globe. Production, 1907, was 5,091,542 lbs. fine coppe considerable gold and silver values. The mine, as developed, is cap making a monthly production of about 1,000,000 lbs. fine copper, a valuable property, of very great promise.

SHAW-GIBSON MINING CO. **NEW M**

Dead. Formerly at Lordsburg, Grant Co., N. M.

SHAWMUT CONSOLIDATED COPPER CO. **COLORADO &**

Office: 62-16 State St., Boston, Mass. Mine offices: Bingham Salt Lake Co., Utah, and Salida, Chaffee Co., Colo. Lester C. Wead, pr Wm. Rotch, vice-president; Robt. A. Jackson, secretary; Wm. Tudor, urer; Herbert Williams, managing director; preceding officers, Alex. C B. W. Currier, Col. E. J. Mayo, Hon. Samuel S. Powers and John R. directors; E. Philbrick, superintendent Colorado mine; Elmer Durfee, s tendent Utah mines.

Organized 1905, under laws of Maine, with capitalization $2,500,000, $5 par. Has an old outstanding bond issue of $19,500, and was said, Fe 1908, to be negotiating with a French syndicate for the sale of new bon of $500,000, at 80, but apparently the latter did not furnish the e funds. The new bond issue was said to be planned for the purchase o tional properties. Company controls the Colorado property through an expiring May, 1909, at $2 per share, on 65,000 shares of the 90,000 capitalization of the Sedalia Copper Co., stock being in escrow. The Sh pays 15% royalty on ore extracted from the Salida property, such applying pro rata on the purchase price of the stock in escrow, if s taken. American Loan & Trust Co., Boston, registrar; State Street Tr Boston, transfer agent.

Lands, in Utah, 13 fractional claims, patented, area 152 acres, on th side of Carr Fork, near the center of the Bingham or West Mountain d showing limestone, porphyry and quartzite, carrying contact deposits b limestone and quartzite, of which 2, under development, are of 5′ es average width, carrying sulphide ores, mainly auriferous and argen chalcopyrite and galena, having an estimated average tenor of 5%

6% lead, 2 to 16 oz. silver and $2.50 to $5 gold per ton, which figures are considered excessive. Development is by a 230′ shaft and 8 tunnels, longest 25′, with upwards of 7,000′ of workings. On the Cuba claim a 5′ ore body has been developed on 2 levels. The company hopes to secure cupriferous porphyry on the Mirror claim.

Equipment of the Utah property includes a 200-h. p. steam plant and a 4-drill Rand air-compressor, with several mine buildings.

The concentrator, at Bingham, of 100 tons rated daily capacity, is of wood, having a 100-ton Gates centrifugal crusher, 2 rolls, 5 Hartz jigs, a Chilean mill and Wilfley tables. The mill is somewhat antiquated in design, and requires remodeling for use.

Lands, in Colorado, 1 claim, area 20 acres, known as the Sedalia mine, and a millsite, circa 6 miles from Salida. The property shows a 35′ to 40′ vein, carrying, near surface, oxide, carbonate and silicate ores, low in copper tenor, and mainly below smelting grade. At depth the ore is sulphide, said to average 3 to 4% copper and circa $1.40 per ton in combined gold and silver values, but carrying an average of 4.5% zinc, which renders it difficult to treat. The mine has an extreme depth of circa 700′, with about 2½ miles of workings.

The Colorado mill is connected with the Sedalia mine by a 1½-mile tramway. The mill is 76x119′ in size, with 4 stories, including a concentrator and leaching plant. The lixiviation plant, which is idle, is said to show a loss of 23% in extraction, as against 15% loss of assay values in smelting.

The Bingham property is idle, work being concentrated at Salida. Production of the Sedalia mine was 5,408 tons of ore, averaging 5.21% copper, yielding 563,513 lbs. fine copper, in 1906, and was 4,209 tons of ore, averaging 6.85% copper, equivalent to 576,696 lbs. fine copper, in 1907.

SHAWMUT GOLD, SILVER & COPPER MINING & MILLING CO. **COLORADO.**

Office: 430 Symes Bldg., Denver, Colo. Mine office: Bonanza, Saguache Co., Colo. G. C. Moore, president; Chas. E. Eckles, vice-president; H. Astor Bush, secretary; E. E. Humes, treasurer. Organized May 8, 1905, under laws of Colorado, with capitalization $1,000,000, shares $1 par. Lands, 22 claims, area 320 acres, on Kerber Creek, said to have about 9,000′ of workings. Company in debt and planned liquidation, at last accounts.

SHAWMUT MINING CO. **UTAH.**

Dead. Succeeded, 1905, by Shawmut Consolidated Copper Co. Formerly at Bingham Canyon, Salt Lake Co., Utah.

SHAWNEE COPPER CO. **COLORADO.**

Office: 424 Central Bldg., Los Angeles, Cal. Mine office: McCoy, Eagle Co., Colo. O. D. Mansfield, president; Chas. J. Price, honorary vice-president; W. R. Price, vice-president and general manager; J. C. McClintock, treasurer; C. W. Dolph, secretary; J. T. Willard, assistant secretary. Organized under laws of Colorado, with capitalization $500,000, shares $1 par. Lands, 7 claims, area circa 71 acres, just north of the Price Copper Mines, in the Red Gorge district, reported to show a blanket vein of 5′ to 7′ width, with quartzite gangue, giving assays of 20% copper, 6 oz. silver and 0.16% gold, which obviously is an error, and probably should be 0.16 oz. gold per ton. Development is by several pits and a 2-compartment 101′ shaft, not yet in ore.

SHAWNEE COPPER MINING CO. **WYOMING.**

Dead. Was merged, 1908, in Shawnee-Wyoming Mining Co. Formerly at Encampment, Carbon Co., Wyo. Fully described Vol. VI.

SHAWNEE-WYOMING COPPER MINING CO. **WYOMING.**

Office: 122½ East Main St., Shawnee, Okla. Letter returned unclaimed

from former mine office, Encampment, Carbon Co., Wyo. John H. Aydelotte, president; Hon. G. F. Hinton, first vice-president; A. M. Coffin, secretary and general manager. Organized 1908, as a merger of the Shawnee Copper Mining Co. and Kyhaco Mining Co.

Lands, 10 claims, area 200 acres, 6 miles from the New Rambler mine, in the French Creek district of the Medicine Bow Mountains, showing sundry fissure veins in granite and contact deposits between schist and quartzite, of which one vein of bog ore, under development, has a 2-compartment 112' shaft showing copper stains.

Company also holds the property formerly owned by Ak-Sar-Ben Copper Co., which had a strong gossan capping of hematite and limestone, opened by an 80' shaft. Company is said to have found some ore giving good assays in copper, silver and gold.

Equipment includes a 45-h. p. steam plant and 4 mine buildings. Idle, but said to plan early resumption.

SHEEP MOUNTAIN MINING & TUNNEL CO. COLORADO.

Dead. Formerly at Crystal, Gunnison Co., Colo.

SHELDEN & COLUMBIAN MINE. MICHIGAN.

Office and mine: care of J. H. Rice, Houghton, Houghton Co., Mich. Lands lie next north of the Isle Royale Copper Co. Idle since 1870. Fully described Vols. I and II.

SHINONOME SMELTER. JAPAN.

Owned by Furukawa Mining Co.

SHOSHONE COPPER CO. WASHINGTON.

Office and mine: Latah, Spokane Co., Wash. J. O. Adams, secretary; preceding officer, J. B. Conard, D. H. Conard, J. H. Stockdale, J. W. Olney, A. B. Shelton and Frank Hosier, directors. Organized circa 1908, under laws of Washington, with capitalization $1,500,000, shares $1 par.

SHOSHONE MINE. NEW MEXICO.

Office and mine: care of Alex Gusdorf, owner, Taos, Taos Co., N. M. Lands, 4 claims, developed by a 175' shaft, with drifts on the 100' and 150' levels, showing an 8' vein with a 2' paystreak, carrying 5% copper, 10 to 12 oz. silver and $60 to $80 gold per ton, balance of vein being claimed to average 5 to 8% copper, 4 to 5 oz. silver and $10 to $12 gold per ton. Property considered promising. Idle.

SHOSHONE MOUNTAIN MINING CO. WYOMING.

Mine office: Meeteetse, Big Horn Co., Wyo. P. W. Gates, manager. Lands, on Sparr Mountain, show a wide vein, carrying values mainly in silver-lead, opened by a 560' tunnel, on the Smuggler claim. Idle.

SHOTWELL TRI-MOUNTAIN COPPER CO. ARIZONA.

Dead. Was absorbed, Feb. 19, 1907, by Cornelia Copper Co. Formerly at Gila Bend, Pima Co., Ariz.

SHUTTLETON MINE. AUSTRALIA.

Dead. Merged, December, 1906, in Crowl Creek-Shuttleton Copper Mining Co.

SIEGEL CONSOLIDATED MINING CO. NEVADA.

Mine office: Siegel, White Pine Co., Nev. H. L. Siegel, manager. Lands, in the Silver Cañon district, show oxidized ores, carrying values mainly in silver, and sulphide ores of copper and lead, carrying values mainly in copper. The best grade of silver-lead ore ranges 80 to 200 oz. in silver tenor per ton. Development is by 2 tunnels, showing sulphide ores in No. 2 tunnel, at 250' vertical depth. Ore is hauled by wagon to Curry, 60 miles, but, with the building of a few miles of mountain road, could be brought within 50 miles of

arm Springs station, on the Nevada Northern railway. Property has been a roducer, on a small scale, since 1901.

IERRA-ALTO COPPER MINING CO. **ARIZONA.**

Dead. Formerly at Phœnix, Maricopa Co., Ariz. Described Vol. II.

IERRA CO., LTD. **SPAIN.**

Office: 32 Nicholas Lane, London, E. C., Eng. Mine office: 10 Plaza el General Santacildes, Burgos, Burgos, Spain. T. Evens, secretary. Organized Apr. 2, 1898, under laws of Great Britain, with capitalization £400,000, hares £10 par; debentures, £478,100, at 5%. Lands, sundry mines of iron, opper, silver and coal, in the provinces of Burgos and Logroño, Spain. Idle nd apparently moribund.

IERRA DE COBRE MINE. **MEXICO.**

Owned by Indiana-Sonora Copper & Mining Co.

IERRA DE ORO GOLD MINING & MILLING CO. **ARIZONA.**

Office and mine: Clifton, Graham Co., Ariz. F. T. Eldredge, president; V. H. Waite, secretary and treasurer; L. P. Potter, manager; Benj. M. Crawford, superintendent. Lands, 15 claims, near the Clifton Consolidated, also a -acre millsite, on the San Francisco river. Development is by tunnels, showng 4 parallel blind veins. A 550′ crosscut tunnel shows a 10′ vein, giving ssay values of 14% copper and up to $10 gold per ton, and a 4′ vein giving ssays of 14% copper and $48 gold per ton. Idle.

IERRA GOLD & COPPER CO. **NEVADA.**

Letter returned unclaimed from former office and mine, Reno, Washoe Co., Nev. C. A. Poage, president; DeWitt C. Turner, vice-president; W. B. Dunlap, secretary; W. V. Irwin, treasurer. Organized Apr. 7, 1906, under laws of Nevada, with capitalization $750,000, shares $1 par. Lands, 8 claims, area 140 acres, in the Peavine district, circa 20 miles north of Reno, developed by a crosscut tunnel and several shallow shafts. Presumably idle.

IERRA GOLD & COPPER MINING CO. **CALIFORNIA.**

Letter returned unclaimed from former mine office, Loyalton, Sierra Co., Cal. Is said to have high grade auriferous and argentiferous copper ore. Idle.

SIERRA MADRE EXPLORATION, LTD. **MEXICO.**

Office: 708 Salisbury House, London, E. C., Eng. J. Keatinge Pollock, chairman; J. W. Gallienne, secretary. Organized Nov. 21, 1900, under laws of Great Britain, with capitalization £60,000, shares 5s. par; issued, £40,000. Debentures, £1,000 authorized, £900 outstanding. Had options on gold and silver properties in the state of Chihuanua, Mexico, which were forfeited. Present landed holdings said to be 200 pertenencias, area 494 acres, in the state of Sonora, supposedly carrying auriferous and argentiferous copper ores. Idle.

SIERRA MORENA COPPER MINES, LTD. **SPAIN.**

Office: 2 Basinghall Ave., London, E. C., Eng. Letter returned unclaimed from former mine office, Peñaflor, Sevilla, Spain. R. Stanton, mine manager; J. E. G. Hadath, secretary. Organized Apr. 17, 1900, with capitalization 80,000, shares £1 par; issued, £60,007. Lands, 215 acres, including La Preciosa nd adjoining mines. Idle.

OCIÉTÉ ANONYME MINIÈRE ET MÉTALLURGIQUE LA "SIERRA NEVADA." **SPAIN.**

Office: 102 Blvd. du Nord, Brussels, Belgium. Mine office: Guejar Sierra, ranada, Spain. Chas. de France, president; preceding officer, Emile Toussaint, ictor-Grégoire Bock and E. LeFevre, directors. Organized March 6, 1895, nder laws of Belgium, with capitalization 1,500,000 francs, shares 500 francs ar, in 100,000 francs 6% preferred and 1,400,000 francs common shares. Prebably idle.

SIERRA NEVADA COPPER CO. NEVADA.

Mine office: Luning, Esmeralda Co., Nev. Development is by a shallow shaft, said to show ore averaging 15% copper, with small silver and gold values. A little ore was shipped, 1907. Presumably idle.

SIERRA NEVADA COPPER MINING CO. IDAHO.

Mine office: Wardner, Shoshone Co., Idaho.

SIERRA DE OAXACA MINING & MILLING CO. MEXICO.

Office: Nashville, Tenn. Mine office: Ixtlán de Juárez, Oaxaca, Mex. Geo. Clark, superintendent. Mine, known as Santa Catarina, has auriferous and argentiferous copper ores, with steam power, employing circa 50 men at last accounts.

SIERRA PACIFIC SMELTING CO. MONTANA.

Dead. Formerly at Butte, Silver Bow Co., Mont.

SIERRA-SONORA SMELTING CO. MONTANA.

Dead. Title changed, 1903, to Sierra-Pacific Smelting Co., also dead. Formerly at Butte, Silver Bow Co., Mont.

SIERRITA MINING & MILLING CO. ARIZONA.

Office and mine: care of J. P. Owen, general manager, Tucson, Ariz. Gerrit B. Linderman, president. Long idle and apparently moribund.

COMPAÑIA MINERA SIETE AMIGOS. MEXICO.

Office: 4 Great Winchester St., London, E. C., Eng. Mine office: Topia, Tamazula, Durango, Mex. Thos. J. Lawrence, president and general manager. Property includes the Comstock, Galena, Guadalupe and other mines, carrying auriferous and argentiferous copper and lead ores. Has steam power and employed circa 50 men, at last accounts.

SIGNAL COPPER CO. ARIZONA.

Dead. Lands sold, circa 1906, to Western Mining & Development Co. Formerly at Planet, Yuma Co., Ariz. Described Vol. VI.

SIGNET GOLD & COPPER MINING CO. UTAH.

Office: Salt Lake City, Utah. Letter returned unclaimed from former mine office, American Fork, Utah Co., Utah. W. H. McConahy, president; J. H. Rothwell, vice-president; W. S. Zehring, secretary; W. H. Young, treasurer; preceding officers and H. A. Hoppaugh, directors. Organized, November, 1903, under laws of Utah, with capitalization $75,000, shares 25 cents par. Lands, 4 claims, in process of patenting, known as the Signet group, in American Fork Cañon, slightly developed. Idle several years.

SILERS MEADOWS COPPER CO. NORTH CAROLINA.

Mine office: Bushnell, Swain Co., N. C. Lands, circa 1,000 acres, in the Smoky Mountains, on the Tennessee copper belt. Has 11 shafts and tunnels, all showing ore, said to give average assays of 5.5% copper and $1.80 per ton in combined silver and gold values. Idle several years.

SILVER BAR COPPER MINING CO. NEW MEXICO.

Dead. Property sold, circa 1902, to Mogollon Gold & Copper Co. Formerly at Cooney, Socorro Co., N. M. Described Vol. II.

SILVER BELL COPPER CO. ARIZONA.

Dead. Title changed, 1903, to Imperial Copper Co. Formerly at Silver Bell, Pima Co., Ariz. Described Vol. III.

SILVER BELL SMELTER. ARIZONA.

Owned by Southern Arizona Smelting Co.

SILVER BOW MINE. MONTANA.

Owned by Butte & Boston Consolidated Mining Co.

SILVER BOW MINING CO. MONTANA.

Office and mine: Butte, Silver Bow Co., Mont. G. E. DeSnell, E. H. Renish, D. S. Mack, David J. Charles and Thos. Stephens, directors. Organ-

ized Sept. 28, 1905, under laws of Montana, with capitalization $20,000, shares $1 par. Property apparently was the Metz claim, relocated January 1, 1904, as the Compromise claim, by forbears of the company, but apparently title was lost to Jos. J. Culbert.

SILVER CITY COPPER CO. **ARIZONA.**

Office: Silver City, N. M. Mine office: Santa Rita, Grant Co., N. M. C. C. Shoemaker, president; E. A. Layne, vice-president; A. F. Kerr, secretary and treasurer; preceding officers, O. C. Hinman, Max Schutz, W. B. Walton, Chas. A. Farnsworth and Saml. Allen, directors; Harry Kline, manager. Organized February, 1907, with capitalization $2,500,000, shares $10 par. Lands, circa 290 acres, near the Santa Rita mine, having several shafts, showing lead and copper ores. Is said to have a small concentrator.

SILVER CLIFF GOLD & COPPER MINING CO., LTD. **IDAHO.**

Mine office: Mullan, Shoshone Co., Idaho. Jas. D. Young, president and general manager; Ed. P. Young, secretary and treasurer. Lands, 18 claims, 7 miles from Mullan, developed by 3 tunnels, longest 1,315', showing chalcocite, bornite and chalcopyrite, giving assays up to 43% copper, with some lead and fair gold values. Has a Pelton wheel, operating under a head of 240', and an 8-drill air-compressor.

SILVER CLIFF MINING CO. **UTAH.**

Mine office: Brighton, Salt Lake Co., Utah. Chas. A. Selby, president; Herbert S. Wright, vice-president; John W. Carlson, secretary and treasurer. Organized circa January, 1908, under laws of Utah, with capitalization $130,000, shares $1 par.

SILVER CREEK GOLD & COPPER MINING CO. **WASHINGTON.**

Office: care of Hugh Clemens, president, Manchester, Iowa. Letter returned unclaimed from former mine office, Index, Snohomish Co., Wash. Organized 1896, with capitalization $1,000,000, shares $1 par. Lands, 2 claims, in the Silver Creek district, having 2 short tunnels. Idle and apparently moribund.

SILVER CREEK GOLD MINING CO. **WASHINGTON.**

Office: Everett, Wash. Letter returned unclaimed from former office, Index, Snohomish Co., Wash. A. J. Westland, president; W. B. E. Edwards, secretary. Capitalization $1,000,000, shares $1 par. Lands, 6 claims, circa 10 miles from Index, opened by about 500' of tunnels, said to show a vein of fair size, carrying small copper values and fair gold and silver values. Idle some years and presumably moribund.

SILVER CREEK MINING & MILLING CO. **WASHINGTON.**

Office: 804 East Washington St., Greensburg, Ind. Mine office: Keller, Ferry Co., Wash. R. L. Boyle, president and general manager; Harry A. Denton, vice-president; Ira J. Hollensbe, secretary and treasurer; John S. Badger, superintendent; preceding officers and R. Ray Hamilton, directors. Organized December, 1900, under laws of Washington, with capitalization $75,000. Company is closely connected with the Keller & Indiana Smelting Co. Lands, 4 claims, patented, area 80 acres, including the Gold Cord mine, in the San Poil district, 5 miles northeast of Keller, well timbered and watered. Silver Creek, near by, is capable of producing considerable water power. Lands show a fissure vein, in diorite, of 3' to 8' width, with a 30" paystreak carrying cuprite, azurite, malachite, bornite and chalcopyrite, with quartz gangue, opened by a 304' shaft and by tunnels of 130' and 620', with tunnels connected by a 195' winze. Plans installing electric power, and beginning production when Keller & Indiana smelter is blown in.

SILVER FISSURE MINING CO. **MONTANA.**

Office: 377 Broadway, New York, N. Y. Mine office: Polaris, Beaver-

head Co., Mont. Henry H. Armstead, general manager; Jas. B. Ford, manager; J. F. C. Wells, smelter superintendent. Property is the Polaris carrying silver, gold and copper ores, latter produced in small quantities by-product. Has steam and electric power, with a 100-ton smelter, emp about 100 men.

SILVER FLAT MINING & MILLING CO. U

Office: care of Abel John Evans, Lehi, Utah. Mine office: American Utah Co., Utah. Capitalization $50,000, shares 10 cents par. Lands, 5 c in the Silver Lake district, carrying auriferous and argentiferous copp lead ores. Idle some years and apparently moribund.

SILVER HILL CONSOLIDATED COPPER CO. ARIZ

Office: Tucson, Ariz. Mine office: Silver Bell, Pinal Co., Ariz. Col. Herring, president; T. M. Smith, secretary; preceding officers and Jo Ross, directors. Capitalization, $3,000,000, shares $1 par. Lands, 6 pa claims, area 120 acres, in the Silver Bell Mountains, 3 miles from Silver opened by tunnel, with about 1,000′ of workings, having an extreme dep 200′, showing copper carbonates and sulphides, apparently occurring as co deposits between limestone and granite.

SILVER HILL MINING CO. NORTH CAROL

Mine office: Silver Hill, Davidson Co., N. C. J. M. Prim, superinten at last accounts. Has auriferous and argentiferous lead, copper and zinc phides. Has a mill with crusher, rolls and 5 stamps. Idle several years.

SILVER KING GOLD & COPPER MINING CO. ID

Mine office: Mackay, Custer Co., Idaho. Development is by tunnel, a shallow shaft. Presumably idle.

SILVER LEAF MINING CO. NEV

Mine office: Luning, Esmeralda Co., Nev. Property is said to show h argentiferous copper ores. Employed 12 men at last accounts.

SILVERMAN-ALASKA MINING CO. ALA

Office: 11 Broadway, New York, N. Y. Mine office: Ketchikan, A Supposedly organized under laws of New Jersey. Lands, on Prince of W Island, are said to show auriferous copper ores, of good grade, with con able development. Idle several years.

SILVER MOUNTAIN MINE & MILL CO. COLOR

Mine office: Empire, Clear Creek Co., Colo. F. G. Bishop, superinten Property has auriferous and argentiferous copper ores, with water powe a 25-ton concentrator.

SILVER MOUNTAIN MINING CO. COLOR

Dead. Succeeded by Silver Mountain Mine & Mill Co. Formerly a pire, Clear Creek Co., Colo.

SILVER MOUNTAIN MINING CO. ID

Mine office: Mullan, Shoshone Co., Idaho. Lands, 4 claims, patented of the Morning mill, opened by a 450′ tunnel showing high grade copper

SILVER PEAK MINING CO. WASHING

Office: care of Gale Smith, secretary, Spokane, Wash. Mine office: welah, Stevens Co., Wash. Conrad Wolfe, president; F. R. Clark, first president; Capt. Hugh James, second vice-president and general ma Lands, circa 200 acres, having a 90′ shaft, showing a 4′ vein carrying ox ores, mainly azurite, assaying 4.7 to 22.7% copper.

SILVER QUEEN MINING CO. ARI

Office: 446 Pearl St., New York, N. Y. Mine office: Superior, Pin Ariz. Wm. D. Fisk, general manager. Organized 1880, but inactive recent change in management. Apparently succeeded by Copper Quee ing Co.

VER SHIELD MINING CO. **UTAH.**

Office: Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake , Utah. Hon. Harry S. Joseph, manager. Property shows a 4′ ore body, l to give selected ores assaying about 6% copper, 27 oz. silver and $2.40 d per ton, also an ore body said to average about 1% copper, 8% lead, 10 silver and $1 gold per ton, in addition to which there is a considerable ly of low grade concentrating ore.

Equipment includes a 5-drill air-compressor and a 15-ton mill, near the uth of the Silver Shield tunnel. A proposed consolidation with the United gham was not effected.

LVER SPUR COPPER MINE. **AUSTRALIA.**

Mine office: Stanthorpe, Queensland, Australia. Property, formerly known the Texas mine, reopened 1906, has a 5′ vein, developed by shaft to shallow pth, giving assays said to average 21% copper. Production, June, 1907, was tons, 18 cwts., 1 quarter, 4 lbs. of copper ore, ounces, unfortunately, being itted from the returns.

LVER SPUR MINING CO., N. L. **AUSTRALIA.**

Office and mine: Silver Spur, Stanthorpe Co., Queensland, Australia. ploys 200 men. Robt. Thos. Vyner, chairman; Edgar Hall, secretary, treas- r and general manager; Harry Wann, mine superintendent. Organized 1879, er laws of Queensland, with capitalization £24,000, shares £1 par, fully ed; 15s. paid in. Has paid dividends, to end of 1906, of £19,650. Annual ting, in March.

Lands, 49 acres, leasehold from the crown, and a 3-acre millsite, 51 miles n the State Railway. Lands show Gympie beds, with slate and Carbonif- s limestone, having 4 fissure veins in slate, carrying lenticular ore bodies, under development, ranging 4′ to 30′ in width, the main ore body being 6′ 0′ wide on the 300′ level. Ore is exclusively sulphide, and complex, ren- ng it difficult to mill, averaging about 1.25% copper, 12% lead, 15% zinc, z. silver and 2s. gold per long ton, values being mainly in silver. Develop- t is by shafts of 180′, 420′, 80′ and 80′, and deepest level is at 400′. Mine opened 1892, and has been worked continuously since.

Equipment includes a 350-h. p. steam plant, with a hoist and a 5-drill ight-line air-compressor. Fuel is coke and wood, latter costing 12s. per . The company has a sawmill and brickyard.

The company controls a coal mine, near Ashford, New South Wales, and recting coke ovens.

The concentrator, having a Krupp ball mill, replacing a Chilean mill, and gs, was rebuilt, 1908. Ore is received by tram-line from the mine.

The smelter, rated at 35 tons daily capacity, has a Ropp calciner, a 42x100″ tin water-jacket pyritic blast-furnace, of 60 tons rated daily capacity, h is incomplete, and two 18-ton reverberatory furnaces, making matte ying an average of circa 30% copper, 600 oz. silver and 1.5 oz. gold per ton, sent to Europe for reduction. Bauxite bricks are used for lining the ox of the reverberatory furnaces, and fuel is wood. The smelter also has untington-Heberlein converter pot, installed 1907.

Production has been as follows: 71,680 lbs. fine copper in 1903; 98,560 lbs. 904; 175,840 lbs. fine copper, 51 long tons lead, 166,869 oz. silver and 202 old in 1906; 176,960 lbs. copper and 150,353 oz. silver, with lead and gold uction, secured from the treatment of circa 7,500 tons of ore, in 1907. The pany plans resumption of lead smelting, and completion of coke ovens, in .

VER TIP GOLD MINING CO. **WASHINGTON.**

Dead. Formerly at Maple Falls, Whatcom Co., Wash.

SILVERTON MINING CO. COLOR

Office: 1612 Ashland Blk., Chicago, Ills. Mine office: Silverton Juan Co., Colo. M. F. Levy, president; W. L. Springer, vice-president; W J. Gibbons, secretary; John Makin, treasurer; Thos. R. Henahan, general ager. Lands, on Sultan Mountain, including the North Star mine, are sa have produced $1,000,000 in silver values, before 1893. Is driving a long tu hoping to open a good ore body. Has steam and water power an 20-stamp mill.

SILVERTON MINING CO. WASHINGT

Dead. Formerly at Silverton, Snohomish Co., Wash.

SIMILKAMEEN COPPER MINES CO. BRITISH COLUM

Dead. Formerly at Princeton, Boundary district, B. C.

SIMILKAMEEN MINING & SMELTING CO., LTD. BRITISH COLUM

Office: care of Chas. F. Law, secretary, Vancouver, B. C. Mine of Princeton, Boundary district, B. C. Fred Buscombe, chairman; W. H. A strong, managing director; preceding officers, E. J. McFealey and Clar Marpole, directors. Organized 1905, under laws of British Columbia, w capitalization $2,000,000, shares $10 par.

Lands, 5 claims, 3 crown-granted, area circa 200 acres, known as the Lawrence and St. George groups, 8 miles from Tulameen City, on Bear Cr a tributary of the Tulameen river, in the Similkameen division of the Bo dary district. Lands, well timbered, have a 250-h. p. available waterfall. velopment is by 4 shallow shafts, of circa 50′ depth each, a short tunnel, numerous trenches, showing a strong ore body, between schist and granite, w intrusive porphyry dikes. The St. Lawrence mine has two 50′ shafts, show an 8′ vein of massive cupriferous iron sulphide, giving average assays of a $10 per ton in copper, silver and gold. The St. George group shows a 4′ v carrying ore with quartz gangue, giving average assays of 1.38% copper, oz. silver and $53 gold per ton. Property considered promising. Idle.

SINAÏ MINING SYNDICATE. ARA

Mine office: Mt. Samarah, Arabia, care of G. Beyts & Co., Suez, E M. Wanner, mine manager, at last accounts. Property is sundry old arge erous copper mines, worked by the early dynasties of Egyptian kings, abandoned probably some 1,500 years before the Rio Tinto was first opene the Phœnicians, which latter event occurred circa 1100 B. C. A little was done, in 1903. Presumably idle for another 4,500-year period.

SINALOA EXPLORATION CO. MEX

Office: Commonwealth Trust Bldg., St. Louis, Mo. Mine office: G lupe de los Reyes, Cosalá, Sinaloa, Mex. Geo. B. Clark, president; Dr. Born, secretary; Chas. Wiggins, treasurer; preceding officers, Chas. H. John Hartman, Henry Leschen, Chas. M. Rhodes and W. S. S. Rodgers, dir Capitalization $500,000, shares $1 par. Lands include 7 square miles o cellaneous timber and mineral lands. Property included the Santa Edu and La Luz mines, which have been disposed of, for stock interests, t Metates Mining Co., and another corporation. Idle.

SINALOA & SONORA MINING & SMELTING CO. MEX

Dead. Formerly in Sinaloa, Mexico.

SIN RIVAL COPPER CO. ARIZ

Office: care of Wm. G. Kirchoff, Los Angeles, Cal. Mine office: Su Pinal Co., Ariz. Lands, 25 acres, near the Silver Queen and Lake Supe Arizona mines.

SISKIYOU COPPER & GOLD DEVELOPING CO. CALIFO

Office: Medford, Ore. W. M. Baxter, president; Ernest Huth, secre Chas. Huth, treasurer. Organized Aug. 13, 1908, with capitalization $10

nds, 75 miles from a railroad, in Siskiyou county, California, are said to show ein of circa 100′ width, giving assays of 4.5% copper and $4.54 gold per ton.

SKIYOU COPPER MINING CO. **CALIFORNIA.**

Office: Lewiston, Idaho. Mine office: Ashland, Jackson Co., Ore. W. R. ley, president; Robt. Hall, vice-president; C. E. Monteith, secretary; pre- ing officers, G. W. Holmes, H. E. Babcock, Robt. E. Kizer and J. F. Reddy, rectors. Organized Oct. 10, 1905, under laws of Idaho, with capitalization ,000,000, shares $1 par. Lands, 4 claims, area 80 acres, near the Blue Ridge ine, in the Upper Applegate district, having tunnels of 75′, 100′ and 125′, said give a good showing of ore. Idle.

SKIYOU GOLD & COPPER CO. **CALIFORNIA.**

Dead. Was a swindle, perpetrated by "Baron" W. E. von Johannsen rmerly at Rollins, Siskiyou Co., Cal. Described Vol. VII.

SKIYOU GOLD & COPPER MINING CO. **CALIFORNIA.**

Dead. Formerly had an office at 44 Central Block, Salt Lake City, Utah.

X EAGLES MINING CO. **WASHINGTON.**

Office: Olympia, Wash. Mine office: Loomis, Okanogan Co., Wash. Robt. st, superintendent, at last accounts. Has auriferous and argentiferous lead l copper ores.

ANGELI MINES. **NORWAY & SWEDEN.**

Mine office: Sjangeli, Nordland, Tromsö, Norway. Lands, circa 30 miles m the coast, with good water power available, include the Sjangeli, Alakats, lfojokk and Ruopsuokjaure groups, mainly in Norway but partly in Sweden. ntry rocks are hornblende schists, with narrow strata of limestone and len- ular bodies of massive gabbro, ores occurring in the schists as cuprite, chal- ite, bornite and chalcopyrite, assaying 2.5 to 55% copper, with an average or estimated at 12.5%, which probably is too high. Development is slight. perty considered promising. Idle.

YLARK COPPER MINING & MILLING CO. **UTAH.**

Dead. Was merged, Sept. 1, 1908, in the Utah United Copper Co. For- rly at Milford, Beaver Co., Utah. Fully described Vol. VII.

ATE CREEK MINING CO. **ARIZONA.**

Dead. Formerly at Prescott, Yavapai Co., Ariz.

ATE CREEK MINING & MILLING CO. **WYOMING.**

Dead. Formerly at Wheatland, Laramie Co., Wyo.

ATER COPPER MINES CO. **MISSOURI.**

Dead. Formerly, circa 1901, at Eminence, Shannon Co., Mo.

EEMINABAD COPPER CO. **INDIA.**

Office: care of P. C. Dutt, manager, Residency Road, Jubbulpore, Central vinces, India. Mine office: Sleeminabad, Central Provinces, India. Lands 1½ miles from Sleeminabad, on the East Indian Railroad, 40 miles from bulpore, and 650 miles from Bombay, almost in the centre of India. formation is of Silurian age, showing dolomite, slate, quartzite, mica- st and jaspelite, much crumpled and metamorphosed, with numerous phyry dikes, ore occurring in the vicinity of the porphyry. The Dharwar sts, here seen, belong to the same geological horizon as the Kolar gold s. Country rocks have a generally east and west strike, and southerly dip. veins occurring at approximately right angles and having a westerly dip. veins have well defined walls, with considerable fluccan, showing slicken s. The property shows 16 veins, in a radius of 10 miles, veins averaging ridth, one vein outcropping for nearly 2 miles. Development is by a 100′ tical shaft, and some diamond drilling has been done, showing auriferous argentiferous malachite and tetrahedrite, giving assay values, according the Indian Government Survey, up to 25% copper, 197 oz. silver and 15

dwts. gold per long ton. Ore produced has been sold for £7 5s. 6d. per ton. Property is considered worthy of careful investigation. Presumably idle.

SLIDE ROCK MINE. MEXICO.

Office: care of Alpheus McCallum, 162 Randolph St., Chicago, Ills. Mine office: Magdalena, Socorro Co., N. M. Lands, 6 claims, area 120 acres, in the Magdalena district, 2 miles from the Santa Fé railway, held under bond and lease by Alpheus McCallum, Dr. Alex. McCallum and Dr. W. W. McCallum. Property has tunnels of 120′ and 200′, showing ore assaying up to 21.2% copper, 6 oz. silver and $19.84 gold per ton, with occasional lead and zinc values. Presumably idle.

SLIDING ROCK COPPER PROPRIETARY, N. L. AUSTRALIA.

Dead. Received a £2,000 subvention from the state, and repaid 12s. thereon, property reverting to the state. Formerly in South Australia.

SLOCUM COPPER CO. ARIZONA.

Mine office: Phœnix, Maricopa Co., Ariz. Lands, in the Winifred district, 22 miles north of Phœnix, have shafts of 130′ and 150′, showing ore assaying well in copper, silver and gold. Property is said to have a 10-ton smelter, and company is said to plan increasing capacity to 100 tons daily, but should open a mine first.

SMELTING & REFINING COMPANY OF AUSTRALIA (1901), LTD. AUSTRALIA.

Dead. Succeeded by Australian Smelting Corporation, Ltd. Formerly at Dapto, N. S. W., Australia. Described Vol. V.

SMOKEHOUSE MINING CO. MONTANA.

Office and mine: Butte, Silver Bow Co., Mont. Bernard Noon, general manager. Property includes the Detroit, National and Copper Bottom claims, also the Smokehouse mine, which consists of a city lot, in the heart of Butte. Was controlled, 1908, through ownership of a large majority of stock, by Davis-Daly Estates Copper Co., and presumably is controlled by successor of latter, the Davis-Daly Copper Co. Mine is described under title of latter.

SMUGGLER GOLD & COPPER MINING CO. WASHINGTON.

Office: 202½ Stark St., Portland, Ore. Mine office: Index, Snohomish Co., Wash. McKinley Mitchell, president; Samuel Hart, secretary; D. S. Williams, treasurer; W. J. Walters, general manager. Organized July, 1904, under laws of Washington, with capitalization $1,000,000, shares $1 par; issued, $600,000. Lands, 19 claims, in the Silver Creek district. Presumably idle.

SNAKE RIVER CONSOLIDATED MINING CO. WYOMING.

Office: 319 Keith and Perry Bldg., Kansas City, Mo. Letter returned unclaimed from former mine office, Encampment, Carbon Co., Wyo. Chas. W. German, president; Geo. Creel, vice-president; L. E. Wyne, secretary and treasurer. Organized July, 1906, under laws of Wyoming, with capitalization $5,000,000, shares $5 par. Lands, 9 claims, area 180 acres, also 520 acres of placer lands, with total holdings of 700 acres, in the Three Forks district, 26 miles from a railroad. Has several pits and shafts of 10′ to 90′ depth, and several tunnels of 50′ to 440′ length, showing mainly sliver-lead ores, with some copper and zinc.

SNAKE RIVER MINING CO. IDAHO.

Letter returned unclaimed from former mine office, Heath, Washington Co., Idaho. Is said to have opened a 24″ vein of ore assaying 40 to 50% copper.

SNOHOMISH MINE. MONTANA.

Owned half and half by Butte Coalition Mining Co. and Butte & Boston Consolidated Mining Co.

SNOQUALMIE COPPER MINING CO. WASHINGTON.

Letter returned unclaimed from former mine office, Skykomish, King Co.,

h. Lands, 8 claims, known as the Mountainview group, near the Dutch er mine, on the middle fork of the Snoqualmie river, showing a ledge of claimed width, opened by 3 tunnels, each showing auriferous and argentif- s copper ore, said to be of high grade. Idle.

OWBALL COPPER MINING CO., N. L. **AUSTRALIA.**

Mine office: Gundagai, N. S. W., Australia. Lands, 38 claims, leasehold, Snowball Hill, 3 miles from Mount Horeb railway station, and 9 miles th of Gundagai. Mine, discovered 1873, was worked vigorously, 1876-1880, ploying up to 400 men. Main shaft, 210′, sunk by old company, shows a n of 30″ extreme width, carrying argentiferous and slightly auriferous laconite, assaying 25% copper. Also has a new shaft of 25′. In 1907 pped 95 long tons of 6.4% copper ore to the Blayney smelter.

OW CLIFF COPPER MINING CO., LTD. **MONTANA.**

Office: 719 Bank St., Wallace, Idaho. Mine office: Saltese, Missoula Co., nt. Andrew G. Gordon, secretary. Incorporated, circa 1907, under laws of ho, with capitalization variously given as $150,000 and $500,000.

OWDRIFT MINING CO., LTD. **MONTANA.**

Office: Wallace, Idaho. Mine office: Saltese, Missoula Co., Mont. Peter din, H. M. Force, W. J. Johnson, W. J. Rhodes and Jas. A. Wayne, directors. anized 1907, under laws of Idaho, with capitalization $1,500,000, shares par.

WSHOE COPPER MINING CO. **MONTANA.**

Mine office: Canyon Ferry, Broadwater Co., Mont. Idle and presumably bund.

WSHOE GOLD & COPPER MINES, LTD. **BRITISH COLUMBIA.**

Office: 717 Salisbury House, London, E. C., Eng. Mine office: Phœnix, ndary district, B. C. Earl of Chesterfield, chairman; Geo. S. Waterlow, ., J. P., vice-chairman; H. W. Batty, secretary; Anthony J. McMillan, aging director; J. W. Astley, superintendent; J. H. Trevorrow, mine super- ndent. Organized Jan. 20, 1901, under laws of Great Britain, with capi- ation £250,000, shares £1 par; issued, £198,155. Property is under lease he Consolidated Mining & Smelting Co. of Canada.

Lands, 4 claims, freehold, area 120 acres, about a quarter-mile from the nby, showing fissure replacements of 25′ to 200′ width, with an average of t 100′, traceable 1,000′, carrying chalcopyrite averaging about 1.5% copper $1.25 gold per ton, ore occurring occasionally in distinct bodies, somewhat ed, but mainly disseminated, in minute particles, through a silicious to areous gangue, with occasional magnetite and specular hemitite. Develop- t is by tunnels of 200′, 250′ and 600′, with shafts of 200′ and 300′, the n shaft having 3 compartments, but bulk of production is secured from -cast workings.

Equipment includes a 150-h. p. double-drum electric hoist, raising 2-ton s, and the high-pressure half of a 30-drill Rand Corliss cross-compound lensing air-compressor.

Production has been as follows: 20,000 tons of ore in 1902; 74,000 tons, ed at an average cost of $1.10 per ton, in 1903; 125,001 tons in 1907, shipped reenwood and Trail smelters, yielding circa 3,125,000 lbs. fine copper. The body is low in grade, though of great size, and apparently the property can perated profitably only on the basis of copper at about 16 cents per pound.

WSHOE MINING CO. **IDAHO.**

Office: Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. Wil- D. Greenough, manager. Capitalization $1,500,000, shares $1 par. Lands, ry claims, partly patented, shortly west of the Snowstorm mine, supposed

to carry the extension of the Snowstorm ore body. Has a crosscut tunn showing auriferous copper ore, without silver values. Idle.

SNOWSLIDE MINING & MILLING CO. IDAHO

Dead. Was organized circa August, 1906, with capitalization $1,000,0 Geo. Snow was president. Formerly at Mullan, Shoshone Co., Idaho.

SNOWSTORM EXTENSION MINING CO., LTD. IDAHO

Office: Chicago, Ills. Mine office: Mullan, Shoshone Co., Idaho. C. M. Vaughn, president; C. M. Sommers, vice-president; J. K. Scott, secretary and treasurer. Capitalization $1,000,000, shares $1 par. Lands, 4 claims, 1 fractional, said to be in the vicinity of the Snowstorm mine.

SNOWSTORM GOLD & SILVER MINING & MILLING CO. COLORADO

Mine office: Durango, La Plata Co., Colo. J. E. Downer, manager, at last accounts. Ores are said to carry gold, silver, copper and mercury. Has water power and a 10-stamp mill. Idle.

SNOWSTORM MINING CO. IDAHO

Office and mine: Larson, Shoshone Co., Idaho. Employs about 300 men. Thos. L. Greenough, president; Wilbur D. Greenough, vice-president and general manager; C. D. Miller, secretary and treasurer; preceding officers, F. J. Kline, Jas. Bean, J. H. Heward and H. E. Chaney, directors; Leo Greenough, superintendent.

Organized 1899, under laws of Idaho, with capitalization $1,250,000, increased, 1906, to $1,500,000, shares $1 par. Net earnings were $5,677 in 1905, $144,322 in 1906, and $498,013 in 1907, gross receipts of latter year being $875,919. Dividends were $90,000 in 1906, $360,000 in 1907, and $150,000 in 1908.

Lands, 11 claims, 7 patented, area circa 220 acres, also a 2-acre millsite, with 300 acres available for tailings, on Stevens Peak, east of Mullan, in the Hunter district, near the Montana boundary. Property shows a fissure vein of 10′ to 35′ width, with an average width of circa 20′, developed for nearly 1,000′ in length. Apparently the ore body is an impregnated cupriferous zone, conforming to the bedding planes in Algonkian quartzite. The ore is highly silicious, and devoid of iron and alumina, being mainly carbonate to a depth of 750′, succeeded by slightly silicious chalcocite, with some bornite and chalcopyrite, the bornite occasionally carrying native silver in quantities up to 1,000 oz. per ton, disseminated in quartzite, all ores being more or less argentiferous, and averaging probably 4 to 4.5% copper, 6 to 7 oz. silver and circa $2 gold per ton, though considerable ore is produced averaging 8% copper.

The mine has a 200′ shaft, but development is mainly by 4 tunnels, No. 3 having a back of 1,200′, showing an ore chute circa 25′ in width and about 850′ in proven length, with No. 4 tunnel driven 500′ vertically below No. 3. Estimates of ore blocked out range from 1,000,000 to 3,000,000 tons, and probably 1,500,000 tons would be a fair figure, the mine having very large ore reserves.

The mine is connected with the railway spur at Larson by a 7,300′ tram-line from No. 2 tunnel and a 3,000′ Riblet aërial tram from No. 3 tunnel.

Electric energy is used throughout, the power installation including 4 motors and an electric light plant, water being brought through a 4½-mile pipe-line, generating 300 h. p. Equipment includes 20-drill and 40-drill air-compressors, driven by direct-connected electric motors.

Buildings include a 40x50′ office, machine-shop, smithy and sawmill, at the mouth of tunnel No. 3, a changing-house and 2 large 2-story hotels with accommodations for 300 workmen, these being 52x84′ and 40x200′ in size, the latter having cost circa $50,000.

The mill, near the mine, was remodeled and enlarged, 1907, when 3 large

ing tanks were added. The mill, of 300 tons nominal daily capacity, ated by 4 electric motors, includes a 125-ton leaching and precipitation , treating carbonate ores averaging 2 to 3% copper and circa 7 oz. silver on, which is said to obtain an extraction of about 90% of the assay values. ore is crushed and then run into 3 agitators, where mixed with a 10% tion of sulphuric acid with calcium chloride, forming a solution of copper hate, which goes from the agitators through a series of 6 settling vats, re the copper is precipitated on scrap iron, and silver is precipitated as a ride, the solution being passed through settling vats and the silver sepad from the clear solution by sodium sulphite, filtered and shipped for reng.

The upper levels of the mine formerly were operated, under a 5-year lease, royalty, by J. H. Heward & Co., but the lease was bought by the company, 4, 1906.

Production, begun 1904, ceased November, 1907, owing to depression in metal market, but was resumed Feb. 20, 1908. For 1906 and 1907 the ores said to have averaged returns of about 5% copper and 7 oz. silver per ton. duction, 1906, was 6,233,940 lbs. fine copper, and for fiscal year 1907 was 03 tons of ore, of which 9,721 tons were treated at the mine and 77,782 were shipped to smelters, yielding circa 10,000,000 lbs. fine copper and 000 oz. silver. The mine ended 1908 with daily shipments of about 500 , sent mainly to the Washoe works, with smaller shipments to smelters at e, Tacoma, Greenwood and Great Falls. Apparently the mine is capable of ling 1,500 tons of 5% ore daily, on present development, which would give nnual output of about 22,500,000 lbs. fine copper, though in all likelihood ral years will be required to reach this figure. The property is one of ptional value and future promise, and is well managed.

WSTORM MOUNTAIN COPPER MINING CO. **IDAHO.**

Dead. Formerly at Mullan, Shoshone Co., Idaho.

WTOP MINING CO. **BRITISH COLUMBIA.**

Office: Detroit, Mich. Mine office: Port Hill, Kootenai Co., Idaho. A. B. intette, president; A. S. Brown, secretary. Capitalization $2,000,000. ds, 13 claims, area circa 250 acres, also 4 timber claims, in the Creston sion of the Boundary district of British Columbia, lying 3 miles north of international boundary line, with postoffice in the United States. Lands w highly argentiferous copper ore. Has 7 buildings.

ORRO GOLD CO. **ARIZONA.**

Office and mine: Harrisburg, Yuma Co., Ariz. Geo. D. Workman, president; C. Workman, secretary; F. C. Smith, general manager. Organized 1901, er laws of Arizona, with capitalization $500,000, shares $1 par. Lands, 10 ms, area 200 acres, in the Ellsworth district, showing a 2′ fissure carrying ellite and chalcopyrite, assaying about $10 gold and 5 oz. silver per ton, h small copper values, developed by a 667′ shaft and 11 tunnels, with 2,467′ underground workings, said to give 5,000 tons of ore blocked out for stoping. a 20-stamp mill, 3 Standard concentrators and cyanide plants of 10 tons 50 tons daily capacity. Presumably idle.

LACE COPPER MINING CO. **ARIZONA.**

Office and mine: Globe, Gila Co., Ariz. Ignatius Schlinger, president and asurer; Henry Smith, vice-president; A. P. Murray, secretary; T. Schlinger, asurer; Wm. Howe, superintendent. Organized 1903, under laws of Arizona, h capitalization $500,000, shares $1 par, in $100,000 preferred and $400,000 mon shares. Lands, 4 claims, in the Bloody Tank district, circa 8 miles Globe, showing 4 ore bodies, of 20″ average width, opened by several pits, ing assays of 8% copper and $15 gold per ton. Presumably idle.

COMPAÑIA MINERA LA SOLEDAD. ME

Office: care of Dr. S. H. Quint, Ameca, Jalisco, Mex. Mine Guachinango, Mascota, Jalisco, Mex. Chris. D. O'Brien, Jr., manager. 78 pertenencias, circa 12 miles southwest of Ameca, in the Sierra Tetil trict, including the Soledad and Santa Isabel mines, carrying auriferou argentiferous copper ore and free gold, with values mainly in gold, in vein, with deepest workings circa 400', showing sulphides below the 200' with 10,000 tons of ore estimated in sight. Equipment includes steam and a stamp-mill having 10 stamps, 1 Wilfley table and 1 Pender concent

SOLMS-BRAUNSFELS'SCHE BERGWERKE. GERM

Mine office: Braunsfels, Rheinprovinz, Germany. Herr Bergas Bellinger, manager. Has iron, manganese and copper ores.

SOLOMON SPRINGS COPPER MINING CO. ARIZ

Office and mine: Naco, Cochise Co., Ariz. Lands, 20 claims, are acres, in the Naco valley, about midway between Bisbee and Naco. show a vein having a gossan of 4' to 40' width. Was under bond, 1903-1905, to Houghton Development Co. Idle several years.

SONGATOF MINE. SIBI

Mine office: Semipalatinsk, Siberia. Is a small producer, located province of Semipalatinsk, near the Chinese boundary line.

SONOMA COPPER MINING CO. NEV

Mine office: Rosebud, Humboldt Co., Nev. B. C. Williams, superi ent. Lands, circa 5 miles east of Rosebud, are opened by tunnel, showi giving good assay values in copper, gold and silver.

SONOMA MINES OF MEXICO, LTD. ME

Office: 4 Great Winchester St., London, E. C., Eng. Mine office: San Juan del Rio, Durango, Mex. Geo. H. Johnson, secretary; W. B. J mine manager; E. L. Wagner, superintendent. Organized Nov. 4, 1899, laws of Great Britain, with capitalization £500,000, shares £1 par; £450,407. Lands, 415 acres, carrying ores of gold, silver and copp Sonoma claims showing a large body carrying 2.5 to 4% copper, with fa and silver values, while the Malinche claim is said to show ore carryi to 10% copper, with small gold and silver values. Has steam power.

COMPAÑIA MINERA DE LA SONORA. ME

Mine office: Cumpas, Moctezuma, Sonora, Mex. Property is the So mine, carrying auriferous and argentiferous copper-lead ores. Has steam

SONORA BONANZA MINING CO. ME

Dead. Reorganized, 1907, as Superior-Bonanza Mining Co. Forme Imuris, Magdalena, Sonora, Mex. Described Vol. VI.

SONORA-CANANEA DEVELOPMENT CO. ME

Office: care of L. A. Burleigh, clerk, Augusta, Me. Letter return claimed from former mine office, La Cananea, Arizpe, Sonora, Mex. Org circa January, 1907, under laws of Maine, with capitalization $5,000,00 parently still-born.

SONORA CENTRAL MINES CO. MI

Office: 920 Merchants Loan & Trust Bldg., Chicago, Ills. Mine Alamos, Sonora, Mex. Employs circa 30 men. Frederick B. Smith, pre Amos C. Ballou, vice-president; W. R. Angell, secretary; Frederick E. treasurer; Jas. R. Hendra, general manager; preceding officers, Otto R. E Edw. B. Tolman, A. C. Waters, Van Ness D. Smith, Edmund J. James, N E. Eaton, Lawrence D. Ballou, A. S. Service and Don S. Harvey, directo Ernest A. Haggott, consulting engineer.

Organized July 18, 1907, under laws of Arizona, with capital $10,000,000, shares $10 par; fully issued. Continental Securities Co.

; Loan, Trust & Savings Bank, Chicago, transfer agent. Annual meeting, h Saturday in September.

The corporate relations of this company are somewhat indistinct, as the any ostensibly was a merger of the International Copper & Gold Co., hern Sonora Development Co., and Santa Cruz Mining Co., but appar- the corporations named as merged remain in existence, and the Sonora ral Mines Co. apparently controls, through stock ownership, the Interna- l Copper & Gold Co., Southern Sonora Development Co. and Santa Cruz ng Co., which in turn apparently control the Montana Copper & Gold Co., a Fé Copper & Gold Co., San Bernardo Copper Co., and Sombreretillo Min- Co., S. A. Inasmuch as the various corporations named are credited with wnership of mining properties apparently claimed also by others of the er, it has been thought best to describe, under the title of Sonora Cen- Mines Co., the various properties claimed, either through stock ownership rough control of subsidiary corporations.

Lands are reported, by the company, as 271 claims, area 780 acres, held the Mexican government, but 271 pertenencias, in Mexico, would have ea of 655 acres only. There also is a 10-acre millsite and 3,087 acres rrienltural lands in the Mayo Valley, where the company claims that 3 can be raised yearly. Lands, as reported by the company, are in the and Alamos districts of Sonora, Mexico, but, in the company's adver- ents, are reported as also occurring in Sinaloa, Mexico, and in Madison Missoula counties, Montana. There are 20 different properties, of which said to carry copper, 1 lead, 6 silver and 8 gold.

Principal property is the Santo Domingo, near the Quintera and Zambona s, showing ore bodies reported as fissure veins in granite and porphyry, as contact deposits between granite and porphyry, apparently occurring vein of 30′ width and 2,000′ length, carrying chutes of payable ore of 6′ to idth and 40′ to 90′ length. The Santo Domingo is said to have ore with twall paystreak assaying up to 220 oz. silver, from silver-copper glance, s said to have 7′ of mixed copper and silver ore, assaying 17 oz. silver on. Development is by a 360′ shaft, with circa 2,500′ of workings.

The Stone Creek mines, sometimes known as the Ballarat & Wallede group, 120 acres, 18 miles from Dillon, Madison Co., Mont., have a 300′ two-com- ent shaft, with 1,370′ of workings, and are said to have shipped some Butte smelters returning 17% copper.

The Dolcoath mine, at Alamos, is said to show ore assaying 12% copper irca 20 oz. silver per ton.

El Sombreretillo gold mine, area 112 hectares, is in the Altar district nora.

La Australia group, 20 claims, in El Fuerte district of Sinaloa, is opened 70′ shaft, with circa 400′ of workings, showing a 12′ paystreak of ore ing 15% copper and 112 oz. silver per ton.

El Sorteo group, 20 claims, 7 miles from San Bernardo, Alamos, Sonora, 30′ vein, opened by a 300′ tunnel, showing ore assaying well in copper, and gold.

El Pedregal group, 15 hectares, 17 miles from Alamos, has a 200′ shaft 1,760′ tunnel.

La Negra group, 14 hectares, adjoining El Pedregal, has a 100′ shaft, with 1,500′ of workings, and is equipped with a 10-stamp mill.

La Perla group, 5 claims, near Quiriego, has a 100′ shaft and a 250′ tunnel.

The Zacatecas group, 10 hectares, near the Trigo gold mine, has 50′ of ngs, said to show gold ore.

The Santa Cruz group includes the Marte and Cuiche gold properties, in

the Altar district, the Santa Cruz having a 380′ shaft and a 300′ tunne
the Cuiche having a 60′ shaft, the properties having circa 3,000′ of wor
and a 10-stamp mill.

El Niño group, 10 claims, 8 miles east of El Pedregal and 30 miles
of San Bernardo, has 90′ of workings, said to show silver-lead ore.

San Pablo group, 10 claims, in the Altar district, is said to be an a
with considerable workings.

La Higuera group, 8 claims, is said to show silver-lead ore.

La Josefita group, 14 claims, 30 miles east of Alamos, has 100′ of
ings, said to show copper ore.

Santa Ana group, 4 claims, has 50′ of workings, said to show silver-le

La Higuera group, 8 hectares, is said to show a 16′ paystreak in
vein carrying mainly silver values.

El Quebradillo group, 4 claims, is said to show copper ore.

The Ruth group, in Missoula county, Montana, with 100′ of worki
said to show copper ore.

The company plans deepening the Santo Domingo mine and ad
100-ton concentrator. The company has some excellent men in its direc
but is not regarded favorably, because of the antecedents of the presi
poration, and the difficulty experienced in determining which is which
matter of properties held by the different interlocking companies. The
ship of 20 scattered properties must be regarded as a source of we
rather than of strength.

SONORA CHIEF MINING CO. M

Office: 323 American Bank Bldg., Kansas City, Mo. Mine office:
de Batuc, Ures, Sonora, Mex. L. H. Jansen, president and genera
nger; Dr. Moses T. Runnels, vice-president; Dr. C. L. V. Hedrick, se
and superintendent; Harry Haldemann, assistant secretary and tre
preceding officers, A. H. Glasner and W. T. Cramer, directors; Morris
mine superintendent. Organized July 18, 1904, under laws of Arizon
procotolized, October, 1905, under laws of Mexico, with capitalization $1,5
shares $1 par.

Lands, 11 claims, in 2 groups, known as the Phœnix and Lakesid
464 acres, 8 miles south of Suaqui de Batuc, with country rocks of g
porphyry, diorite and limestone, showing several large, continuous ore
of which 4 are of 5′ to 6′ average width, carrying ores said to give a
assays of 15.8% copper, 10 to 80 oz. silver and $25 to $49 gold per ton.
pany reports that 10% of production is auriferous and argentiferous whi
Development is by shafts of 95′ and 125′, and by tunnels of 25′, 754′ a
with circa 4,000′ of workings. Development is mainly at the Phœnix
The Yaqui river has an available waterfall, estimated as capable of gen
440 h. p. Idle.

SONORA CONSOLIDATED GOLD MINES CO., LTD. M

Office: Quiriego, Alamos, Sonora, Mex. Capitalization $3,000,000,
$5 par. Is controlled, through stock ownership, by Douglas Copper Co.
circa 140 acres, known as the Trigo group of gold claims, said to
antiguas having extensive workings.

SONORA COPPER COMPANY OF MEXICO. M

Dead. Assets, consisting of a lawsuit, sold to Puertecito Cop
Formerly at La Cananea, Arizpe, Sonora, Mex.

SONORA COPPER SMELTING CO. M

Office: 424 Scarritt Bldg., Kansas City, Mo. Mine office: Noria,
lena, Sonora, Mex. Employs circa 60 men. A. M. Conrad, president an
intendent; J. M. Lowe, vice-president; C. E. Kroh, secretary; W. R.

surer; preceding officers, R. S. Stone, F. E. Reed and E. E. Axline, directors. anized June 25, 1908, under laws of Arizona, as successor of Sonora Copper with capitalization $3,000,000, shares $10 par; issued, $1,500,000. Annual ting, third Tuesday in December.

Lands, circa 500 acres, with miscellaneous holdings of approximately 8,500 s of valley land, on both sides of the railroad, including a townsite at a, between Llano and Puerto. Lands are in 5 groups, known as the Ex- ion de la Washington, Cobre Grande, Creston de Cobre, Veta Grande and ge. Principal property, area 123 acres, shows limestone, diorite, porphyry, ite and quartzite, carrying various ore bodies, mainly with north and strike, principal work being on the large ore body of th Extension de ashington group, of 4' to 97' width, said to be traceable 3 miles on the any's lands, carrying cuprite, melaconite, azurite, malachite, chalcocite, opyrite, chrysocolla, tetrahedrite and galena, giving assays of 2 to 10% r, 5 to 25 oz. silver and $2.50 to $30 gold per ton. Development is by 7 s, of 53' to 260' depth, and by tunnels of 50', 200', 245', 250' and 1,150', about 4,500' of workings, estimated to show 50,000 tons of ore. Upper ngs are said to show veins of 25' and 40' width, carrying oxidized ores. Equipment includes a steam plant and a 25-h. p. gasoline hoist, and the any has a store at the mine. Company plans continuous development, ventually adding necessary mining and reduction equipments.

RA DEVELOPMENT CO. MEXICO.

ead. Lands sold, 1907, to Fay-Cananea Copper Co. Formerly at Mocte- Sonora, Mex. Described Vol. VI.

RA & KANSAS CITY DEVELOPMENT CO. MEXICO.

ead. Formerly at Suaqui de Batuc, Ures, Sonora, Mex.

RA MINING CO. MEXICO.

ead. Was succeeded, circa 1906, by Antigua Copper Co. Formerly at caliente de Baca, Fuerte, Sinaloa, Mex. Fully described Vol. VI.

RA MINING & DEVELOPMENT CO. MEXICO.

ffice: Spitzer Bldg., Toledo, Ohio. Mine office: San Antonio de la a, Ures, Sonora, Mex. A. E. Klauser, president; A. V. Baumann, vice- lent; H. B. Thompson, secretary; H. R. Klauser, treasurer; Herman Lock- Jr., general manager; H. C. Gerber, superintendent; preceding officers A. Leeper, directors; Samuel James, consulting metallurgist. Organized with capitalization $5,000,000, shares $1 par; issued, $1,500,000. Inter- ual Trust Co., Boston, registrar; Frederick R. Tibbetts, Boston, Mass., fer agent.

Lands, 154 hectares, also circa 1,000 acres miscellaneous lands, including site, in the Hermosillo, Sahuaripa and Ures districts. Nearest railroad shanea, Rio Yaqui y Pacifico, 30 miles distant, but direct rail connection xpected later.

Company has experienced considerable trouble from Yaqui Indians ts, and also has met with some difficulties in working out metallurg ems.

RA MINING & MILLING CO.

ead. Was succeeded, Feb. 15, 1906, by Juarez Mining Co. Formerly at ana, Altar, Sonora, Mex. Described Vol. V.

RA & SOUTHWESTERN MINES CO.

ffice: care of Chas. W. Boles, Clinton Bldg., Columbus, Ohio. January, 1907, to develop properties in the Ures district of Sonora.

RENSE PROSPECTING & DEVELOPING CO.

ead. Formerly at Ures, Sonora, Mex. Described Vol. VI.

ANHIA MINEIRA DE SOTIEL-CORONADA.

ffice: Rua dos Sapateiros 22, Lisboa, Portugal. Mines

Huelva, Spain. Senhor Dom Agusto Fuschini, chairman; Thos. Morri Co., agents. Lands, 666 hectares, including 34 old mines, carrying cupri pyrite. Works steadily, in a rather small way, producing cupriferous pyri cement copper equivalent to an average annual production of 1,000,0 fine copper.

SOCIEDAD ANONIMA MINAS DE SOTO. S

Office: Bilbao, Spain. Mine office: Reinosa, Santander, Spain. under perpetual lease to Enrique G. W. Romer, with option of purcha described under title Minas de Soto.

MINAS DE SOTO.

Office: 32 Muelle, Santander, Spain. Mine office: Reinosa, San Spain. Lands, owned by Sociedad Anonima Minas de Soto, are held, petual lease, with option of purchase, by Enrique G. W. Romer. P which is the most important copper mine in the north of Spain, show carrying high grade chalcopyrite, and about 250 tons of 28% ore were latter half of 1906 and first half of 1907. Has steam power and a sm Production, 1907, estimated at 125,000 lbs. fine copper.

SOUTH AFRICAN COPPER ESTATES, LTD. CAPE C

Dead. Dissolved, September, 1904. Formerly in Little Namaquala Colony.

SOUTH AFRICAN GOLD & COPPER SYNDICATE, LTD. TRAN

Office: 237 Finsbury Pavement House, London, E. C., Eng. Mi Pietersburg, Zoutpansberg, Transvaal. E. G. Knights, chairman; Smith, secretary. Organized Nov. 24, 1903, under laws of Great Brit capitalization £15,000, shares £1 par, in £10,000 preferred and £5,000 shares. Lands, 11,300 acres, held under option, southeast of Pietersbu stated that gold and copper ores have been found.

SOUTH AMERICAN COPPER SYNDICATE, LTD.

Office: 2 Broad Street Place, London, E. C., Eng. E. Edwards, c Chas. D. Comrie, secretary. Organized March 27, 1907, under laws Britain, with captalization £7,500, shares £1 par. Was organized wi of acquiring and working copper mines in South America. Location if any, unknown.

SOUTH AMERICAN DEVELOPMENT CO.

Dead. Was succeeded, circa 1903, by Cerro de Pasco Mining Co. at Cerro de Pasco, Junín, Perú.

SOUTH AUSTRALIAN COPPER SYNDICATE, LTD. AUS

Dead. Never did any business.

SOUTH BEE SYNDICATE. AUS

Mine office: Cobar, Robinson Co., N. S. W., Australia. Organi under laws of New South Wales, with capitalization £25,000, share Lands, lying south of the Queen Bee Mine, have a shallow shaft, copper stains.

SOUTH BISBEE COPPER MINING & TOWNSITE IMPROVEMENT CO. A

Dead. Wound up, 1904. Lands sold to Lake Superior & Pittsbur Co. Formerly at Bisbee, Cochise Co., Ariz. Described Vol. II.

SOUTH BLUESTONE MINE. N

Mine office: Yerington, Lyon Co., Nev. Is said to have a goo showing of ore.

SOUTH BUTTE COPPER MINING CO. MO

Office: 51 East Broadway, Butte, Silver Bow Co., Mont. Mi Corbin, Jefferson Co., Mont. Jas. Davidson, president and general Geo. B. Conway, vice-president; Frank E. Whitehead, secretary; J. W.

preceding officers and R. E. Tait, directors; Hugo Freyler, superin-
Organized Jan. 24, 1906, under laws of Arizona, with capitalization
shares $1 par; issued, $860,000. Annual meeting, first Wednesday

, 8 claims, freehold, area 151 acres, in the Summit Valley district, 2
of Butte, opened by the 326′ Virginia shaft. Company also holds,
d and lease, the Daphne group of 5 claims, adjoining the Boston &
ne, in Jefferson county, having a 175′ shaft and a 460′ tunnel, said
12′ vein carrying native copper and some ore assaying up to 14%
oz. silver and $2 gold per ton. Equipment includes a 75-h. p. hoist
air-compressor, with several small mine buildings. The Daphne
eld under a bond for $83,000, due Nov. 2, 1909, with lease on 15%
yments to be applied on the bond.

UTTE MINING CO. **MONTANA.**

office: Butte, Silver Bow Co., Mont. John G. Williams, M. E. Riley
r Howell, directors. Organized May 25, 1906, under laws of Minne-
capitalization $500,000, shares $100 par. Was organized by the
thern Railway interests, and is controlled by the Lewisohns. Has
tigation with numerous individuals and companies, including the
, in efforts to quiet title to a narrow strip of the Great Northern
y, to which the mineral rights are claimed by the East Butte and
te.

UTTE ZONE MINING CO. **MONTANA.**

returned unclaimed from former mine office, Butte, Silver Bow Co.,
F. Floyd, John Redlich, Albert Cully, Geo. E. Seiple and Edward
ectors. Organized, early 1907, with capitalization $1,000,000, shares
ever operative and apparently moribund.

ANANEA COPPER MINING CO., S. A. **MEXICO.**

Mexican incorporation of the Pennsylvania & Cananea Copper Co.

ANNINDAH SYNDICATE, LTD. **AUSTRALIA.**

office: Mount Cannindah, Queensland, Australia. Lands, 1 to 2
h of the Mount Cannindah mine, are supposed to carry circa one-
of the extension of the Apple Tree ore body. Mine has a 75′ under-
showing a vein of 7′ to 8′ width, and management plans sinking 2
underlay shafts. Shipments, December, 1906, to April, 1907, of about
hand selected ore, gave average returns of circa 9.7% copper, 1.4
and 2 dwts. gold per long ton. Idle.

ATTLIN MINE. **AUSTRALIA.**

office: Ravensthorpe, Phillips River gold field, Western Australia.
th of the Mt. Cattlin, show a 30′ vein.

OLUMBUS MINING CO. **UTAH.**

Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah.
). Jacobson, president and manager; Walter L. Maas, secretary and
preceding officers, Val. S. Snow, S. A. Whitney and Wm. M. Bradley,
Organized Feb. 11, 1904, with capitalization $3,000,000, shares $1
cessor of Centennial-Bingham Mining Co., and increased capitaliza-
September, 1908, to $500,000, shares $1 par, to provide capital for
the Columbus-Wedge. In October, 1908, sold 70,000 shares of treas-
for $35,000 cash, leaving 30,000 shares unissued, and gave 115,000
new stock to the Columbus-Wedge Mining Co., in exchange for prop-
ter.

include the Wedge group, showing good silver-lead values, and the
y group, opposite the Columbus Consolidated, having a tunnel cut-
fissure vein having a hanging-wall paystreak assaying up to 11%

copper, 10 oz. silver and $2.80 gold per ton. In November, 1908, on t level, a crosscut showed ore assaying 10% copper, 5.5% lead and 25 oz per ton.

Company formerly held a property, circa 4 miles from Park Cit 6 acres, having a 1,050′ tunnel, showing mainly silver-lead values, wit ore of 3.5 to 45% copper tenor, from which small shipments were mad but apparently this property is idle, or has been forfeited.

SOUTHERN ARIZONA SMELTING CO. ARI

Office: 11 Pine St., New York, N. Y. Operating office: Tombstone Works office: Silver Bell, Pima Co., Ariz. Employs circa 125 men. E. B president; W. F. Staunton, vice-president and general manager; A. N. secretary and treasurer; preceding officers, Selwyn Eddy, V. L. Mason, Murphy and H. M. Robinson, directors; A. S. Donan, superintendent. ized Aug. 10, 1906, under laws of Arizona, with capitalization $1,500,000, $100 par. Is controlled, through ownership of entire stock issue, by I Copper Co. Works represent an investment of circa $500,000.

Lands, 8 miles south of Red Rock and 12 miles from the Imperial with a down grade haul, include the 110-acre townsite of Sasco, with 4 each 50x150′.

The reduction plant, known as the Sasco smelter, includes a sa mill, blast-furnace building, converter building, power-house, boile machine-shop and smithy, all of steel frames, also dwelling houses, a office and miscellaneous buildings. All of the principal buildings are p so that they can be extended in two directions, providing an almost un capacity for expansion. The smelter, blown in Feb. 1, 1908, does a custom business, but treats mainly ore of the Imperial mine, and is of 3 nominal daily capacity.

The sampling mill is small, but fully equipped. Ore is received fr mines in 50-ton steel-bottom dump cars, discharging into 4,000-ton stora

The cupola building is constructed for 2 blast-furnaces, with one installed, this, rated at 300 tons, giving an actual duty up to 400 ton Charging is by cars hauled by electric locomotives, on tracks of 36″ Settler is elliptical, slags, which are of low copper tenor, skimming int slag-trucks, hauled by steam locomotives on a standard-gauge track. T chamber is 100x350′, leading to a 175′ stack of 12′ diameter.

The converter department has a 50-ton electric traveling crane, span. There are 6 shells, 84x126″ in size, rotated hydraulically, an from the converter stands lead to an independent dust-chamber and Product is blister copper, averaging 99.3% copper, with small quant silver and gold.

The power plant has an electric traveling crane and a 650-kw. power plant with 440-volt induction motors. There are 2 Nordberg Cor densing engines, direct-connected to a No. 9 Connersville blower and berg cross-compound Corliss condensing air-compressor with 15″ and 30 cylinders, with two 36″ air cylinders and 42″ stroke. The boiler-hou Morrison marine boilers. Water is secured from wells in the Santa Cru by an 8″ pipe-line.

SOUTHERN COPPER CO.

Organized Feb. 22, 1905, under laws of Maine. Location of lands, unknown.

SOUTHERN COPPER CO. NORTH CAR

Mine office: Gold Hill, Rowan Co., N. C. A. M. A. Richardson, pr Otto Gerner, vice-president; W. M. Richardson, secretary; Walter

man, manager. Organized circa May, 1906, with capitalization $3,000,000. umably idle.

THERN COPPER MINING CO. **UTAH.**

Office: care of J. M. Reynolds, secretary, treasurer and general manager, Lake City, Utah. Mine office: Milford, Beaver Co., Utah. J. K. Persons, ident; B. J. Persons, vice-president; Ed. Mills, superintendent. Organized, , 1905, under laws of Utah, with capitalization $300,000, shares $1 par. ds, 5 claims, area 100 acres, surveyed for patents, known as the Brooklyn up, 12 miles north of Milford, adjoining the Wahsatch King. Development by a 60′ shaft and 200′ tunnel, latter cutting a vein carrying fair values in per, silver and gold. Presumably idle.

UTHERN CROSS COPPER MINE CO., LTD. **BRITISH COLUMBIA.**

Office: 8 Broad Street Ave., London, E. C., Eng. Mine office: Alberni, ncouver Island, B. C. T. D. Conway, chairman and managing director; thur Hebden, secretary. Organized March 5, 1906, under laws of British lumbia, with capitalization $750,000, shares $5 par.

Lands, 5 claims, area 250 acres, crown-granted, with an option over 500 es adjoining, on the northern side of Uchucklesit Harbor, showing a vein 12′ to 20′ width, with estimated average of 15′, traceable for some distance, eloped by an opencut and a 370′ tunnel, showing chalcopyrite assaying up 8% copper and $11 gold per ton. Is said to plan a smelter. Shipped, 1906, 100 tons of ore.

THERN NEVADA GOLD & COPPER MINING CO. **NEVADA.**

Letter returned unclaimed from former mine office, Luning, Esmeralda Nev. I. H. Hood, secretary. Organized under laws of South Dakota, with talization $1,000,000, shares $1 par. Lands, 2 claims, area 40 acres, 3 s southeast of Luning, said to be in litigation.

THERN PACIFIC GOLD & COPPER MINING & MILLING CO. **UTAH.**

Office: 213 West Fifth St., Salt Lake City, Utah. Mine office: Ogden, er Co., Utah. Employs 5 men. T. S. Freeney, president; Wm. Pow, vice-ident; J. W. Burnham, treasurer and general manager. Organized July 1903, under laws of Utah, with capitalization $1,000,000, shares $1 par; d, $773,910.

Lands, 12 claims, unpatented, area 240 acres, in the Sierra Nevada dis-, circa 8 miles north of Ogden, carrying circa 25 ore bodies, mainly as con- deposits between quartzite and gneiss, of which 3, under development, of 200′ estimated average width, show some oxidized ores, but mainly sul-es, including covellite, bornite and chalcopyrite, developed by 8 tunnels, est 330′, with circa 700′ of workings, with considerable ore in sight, giving age assays of 3.5% copper and circa 3 oz. silver per ton, with occasional gold values. Company plans continuous development.

THERN SMELTING & REFINING CO. **TEXAS.**

Dead. Abortive. Formerly at El Paso, El Paso Co., Tex. Described Vol. VI.

THERN SONORA DEVELOPMENT CO. **MEXICO.**

Office: 135 Adams St., Chicago, Ills. Mine office: Alamos, Sonora, Mex. erick E. Mills, president; Lucius W. Winchester, vice-president; Lawrence allou, secretary; Amos P. Ballou, treasurer and general manager; preceding rs, F. B. Smith and John W. Elliott, directors; J. R. Hendra, superin-ent. Organized July 1, 1904, under laws of Arizona, with capitalization 0,000, shares $1 par.

Lands, 28 pertenencias, area 69 acres, held under name of San Bernardo ng Co., showing granite and diorite carrying various fissure veins, of which Santo Domingo vein, of 14′ average width, is traceable 3,200′, and the radilla vein, estimated at 15′ average width, and the Santa Ana at 8′ ge width. Development is by a 300′ shaft, with 360′ of workings, esti-

mated to show 15,000 tons of carbonate ore, assaying 2% copper, 5% lead, 6 oz. silver and $42 gold per ton, which seems too high. Equipment includes an 80-h. p. hoist, good for 1,500', a store, assay office and mill, latter not in use.

SOUTHERN STAR COPPER & SMELTING CO.

Dead. Formerly had an office in St. James Bldg., New York, N. Y.

SOUTHERN ZINC & COPPER MINING CO. ARKANSAS.

Dead. Formerly at Gillham, Sevier Co., Ark. Described Vol. VI.

SOUTH FURNACE CREEK COPPER CO. CALIFORNIA.

Office: Union Trust Bldg., Los Angeles, Cal. Mine office: Greenwater, Inyo Co., Cal. A. T. Woods, treasurer; L. R. Myers, secretary; preceding officers, C. J. Fox and J. G. Lawrence, directors. Lands, 9 claims, 14 miles south of Greenwater, on the eastern slope of the Funeral Range, said to have a 100' shaft on a 5' vein, showing ore assaying 25% copper and 10 to 12 oz. silver per ton. Idle.

SOUTH GLOBE DEVELOPMENT CO. ARIZONA.

Dead. Lands were 12 claims, 6 miles south of Globe, having a shallow shaft showing auriferous sulphide copper ore of fair tenor. Formerly at Globe, Gila Co., Ariz.

SOUTH GREENWATER COPPER CO. CALIFORNIA.

Office: Tonopah, Nev. Mine office: Greenwater, Inyo Co., Cal. John S. Hills, president and general manager; Malcolm Smith, vice-president; R. C. Moore, secretary and treasurer; preceding officers, Hon. T. L. Oddie and Roger C. Knox, directors; H. S. Chapman, superintendent. Organized November, 1906, under laws of Nevada, with capitalization $1,500,000, shares $1 par.

Lands, 14 claims, 1 fractional, area circa 275 acres, known as the Miller group, at Miller Springs, 15 miles south of Greenwater, having 3 shallow shafts showing 2 veins, 1 carrying a promising outcrop of about 40' width, and 1 of about 6' average width carrying ore giving good assay values in copper. Property is above the average of promise in the Greenwater district. Idle.

SOUTH KEARSARGE MINE. MICHIGAN.

Owned by Osceola Consolidated Mining Co.

SOUTH MOUNT LYELL MINING CO., LTD. TASMANIA.

Dead. Formerly at Gormanston, Montagu Co., Tasmania. Described Vol. VI.

SOUTH NAMAQUA SYNDICATE. CAPE COLONY.

Dead. Was merged, circa March, 1908, in Insizwa Nickel & Copper Developing Co., Ltd. Formerly at Kokstad, Cape Colony.

SOUTH NEVADA COPPER SYNDICATE. NEVADA.

Letter returned unclaimed from former office and mine, Goldfield, Nev. Walter Stone, president; Frank B. Hobbs, secretary and treasurer; Wm. Prior, general manager. Organized 1906, under laws of South Dakota, with capitalization $2,000,000, shares $1 par. Lands, 5 claims, area 100 acres, known as the Santa Ana group, in the Slate Range, circa 14 miles south of Goldfield, having a 30' shaft, showing a 30' vein, surface ores of which assay 9 to 10% copper, 8 oz. silver and $10 gold per ton. Presumably idle.

SOUTH PACKER MINE. IDAHO.

Mine office: Ivers, Custer Co., Idaho. Has lands near the Lost Packer.

SOUTH PEACOCK MINING CO. IDAHO.

Office: 88 State St., Boston, Mass. Letter returned unclaimed from former mine office, Weiser, Washington Co., Idaho. Thos. S. Wentworth, president; Wm. L. Pratt, secretary. Capitalization, $500,000. Has a shaft showing cuprite. Idle some years.

SOUTH RANGE MINING CO. MICHIGAN.

Office: 60 State St., Boston, Mass. Mine office: Houghton, Houghton Co., Mich. John W. Belches, president; H. W. Wesson, treasurer

Nichols, secretary. Capitalization $2,500,000, shares $25 par. Lands, circa 7,000 acres, undeveloped, lying mainly between the Globe and Belt properties, in Houghton and Ontonagon counties, Michigan, and so located that future mining companies, carved out of new territory in this district, will have to see the South Range company, or organize with very jagged outlines, in many cases.

SOUTH SAN XAVIER COPPER CO. **ARIZONA.**

Office and mine: Tucson, Pima Co., Ariz. Lands show a contact deposit between limestone and porphyry, with a good gossan, of 30′ estimated width, carrying a 30″ paystreak of sulphide ore assaying up to 28% copper and 12 oz. silver per ton, opened by a two-compartment shaft of circa 200′ depth. Smelter shipments have returned 13.5 to 20% copper, with small silver values.

SOUTH SIDE MINING CO. **MICHIGAN.**

Office: 68 Devonshire St., Boston, Mass. Mine office: Leopold Bldg., Houghton, Houghton Co., Mich. John C. Watson, president; Fred W. Nichols, agent; C. O. Burbank, secretary and treasurer. Reorganized April, 1899, under laws of Michigan, as successor of company of same name, which levied assessments of about $90,000 to 1872. Annual meeting, first Monday in March. Lands, circa 200 acres, lying west of the Dakota and north of the Naumkeag, immediately west of Houghton, with one-half mile frontage on Portage Lake. Mining operations were confined to exploratory work many years ago. Idle since circa 1873.

SOUTH SWANSEA MINING CO. **UTAH.**

Office: 431 Atlas Blk., Salt Lake City, Utah. Mine office: Silver City, Juab Co., Utah. Claude V. Wheeler, president; J. M. Wheeler, vice-president; J. C. Croxall, treasurer; W. H. Farnsworth, secretary; Jesse Knight, general manager. Organized May 11, 1908, under laws of Utah, with capitalization $300,000, shares $1 par. Has paid dividends of $169,460, last dividend being disbursed April, 1904. Ore carries mainly silver values, with some copper and gold. Production, 1907, was only 3 carloads of ore.

SOUTH THARSIS MINING CO., N. L. **TASMANIA.**

Dead. Property was sold, for £45,000, to Mount Lyell Mining & Railway Co., Ltd. Formerly at North Mount Lyell, Montagu Co., Tasmania.

SOUTHWEST AFRICA CO., LTD. **GERMAN SOUTHWEST AFRICA.**

Offices: 3 Laurence Pountney Hill, Cannon St., London, E. C., Eng., and Unter den Linden 35, Berlin, Germany. E. Davis, chairman; C. Launspach, secretary; Tob. Tönnesen, African manager. Organized Aug. 18, 1892, with capitalization £2,000,000, shares £1 par; issued, £1,200,000. Property is mineral concessions covering 22,000 square miles, including nearly 4,500 square miles of freehold, in Damaraland, and mining rights to 23,000 square miles in Ovamboland, total holdings including 40,000 square miles of freehold, with mining rights over 90,000 square miles additional, also sundry railroad concessions. Holds large share interests in the Otavi Mines & Railway Co.

SOUTHWESTERN CONSOLIDATED SMELTING CO. **CALIFORNIA.**

Office: 39 Cortlandt St., New York, N. Y. F. C. Kaye, president; J. C. De Wolfe, treasurer; I. L. Thompson, secretary; E. Homer Grasty, manager. Organized August, 1904, with capitalization $2,000,000, shares $1 par. Company claimed to plan building a smelter somewhere in California. Was merely a stock-jobbing device, promoted by Messrs. Kaye, De Wolfe & Co., whose "mining" operations merely lead to the depletion of the pockets of their "customers."

SOUTHWESTERN COPPER CO. **NEW MEXICO.**

Dead. Lands sold, circa May, 1906, to Burro Mountain Copper Co. Formerly at Silver City, Grant Co., N. M.

SOUTHWESTERN COPPER CO. **TEXAS.**

Letter returned unclaimed from former mine office, Sierra Blanca, El Paso

Co., Tex. F. W. Thomme, president. Lands, 1 mile from Sierra Blanca a 200′ shaft, showing a 6′ vein, carrying ore assaying up to 18% copper steam power. Idle.

SOUTHWESTERN COPPER & IRON CO. NEW ME

Dead. Lands sold, May, 1906, to Burro Mountain Copper Co. Fo at Leopold, Grant Co., N. M.

SOUTHWESTERN DEVELOPMENT & IMPROVEMENT CO. ARI

Mine office: Clifton, Graham Co., Ariz. Property is the Polaris held under bond and lease, from Polaris Mining & Milling Co. Prop described under title of owner.

SOUTHWESTERN GOLD & COPPER CO. ARI

Dead. Formerly at Douglas, Cochise Co., Ariz.

SOUTHWESTERN MINE & SMELTING CO. ARI

Dead. Formerly at Gleeson, Cochise Co., Ariz.

SOUTHWESTERN MINING CO. ME

Dead. Was merged, circa August, 1908, in Kansas-Cananea Copp Formerly at La Cananea, Arizpe, Sonora, Mex. Fully described Vol. VI.

SOUTHWESTERN SMELTING CO. CALIFO

Dead. Formerly at Letcher, San Bernardino Co., Cal.

SOUTHWESTERN SMELTING & REFINING CO. ARI

Dead. Sold, Sept. 15, 1906, by sheriff, under execution, to Walter L. Formerly at Benson, Cochise Co., Ariz. Described Vol. VI.

SOUTH WEST SMELTING & REFINING CO. NEW ME

Office: 517 Francis St., St. Joseph, Mo. Mine and works office: Oro Otero Co., N. M. Geo. J. Green, president; Geo. A. Guild, vice-president Travis, secretary and treasurer; Daniel B. Hunt, assistant secretary; W Evans, assistant treasurer; preceding officers, Mansfield M. Riggs, Arc M. Woodson, John E. Lonsdale, Chas. B. Hughes, Clinton P. Cockrill, Standley and Ichabod McCord, directors; J. J. Murray, general manager Airheart, superintendent.

Organized Dec. 5, 1904, under laws of New Mexico, with capital $750,000, increased, circa April, 1907, to $1,250,000, shares $100 par. $150,000, at 5%. Controls, through stock ownership, New Mexican L Development Co., which owns the townsite of Orogrande, and is said to a number of other allied and subsidiary corporations. Annual meeting Tuesday in November.

Lands, 36 claims, area 720 acres, also an 80-acre smeltersite and a 6 townsite, giving total holdings of 1,440 acres, bought of the Jarilla Co., in the Silver Hill district of Otero county and the Organ district of Ana county, New Mexico. Principal holdings are in the Silver Hill d in the Jarilla Mountains, circa 60 miles north of El Paso, and, in addi copper lands, the company holds sundry placer gold claims and a mine of erous iron ore, highly suitable for fluxing. The company also owns a lim quarry for flux, which has been stated in the press to carry 80 cents to $ per ton, which seems too good to be true.

Principal mining properties are the Lucky, Nanny Baird, Iron Ma Garnet mines. The three properties first named show limestone and por carrying 16 contact deposits, of which 7, more or less developed, rang 3′ to 40′ in width, with known length of 100′ to 700′, carrying native cuprite and malachite, said to give average assays of 7% copper, 2 oz. and $5 gold per ton, all ores being slightly argentiferous and strongly auri

The Lucky mine, developed by a 300′ shaft, and by tunnels of 25 625′, is said to show a large amount of auriferous copper ore averaging 7% copper and $6 gold per ton, and the mine has proven very wet. tramway from the mine leads to the railway track.

The Nanny Baird mine has a vein of circa 25′ average width, carrying l copper and silver values, with good gold values, and to the south is a r gold tract, of some promise. Development is by a 100′ vertical shaft an 800′ incline shaft. The Lucky and Nanny Baird mines jointly have t one mile of workings, estimated by company to show 100,000 tons of of good average grade blocked out for stoping, which figures probably are high.

The Iron Mask mine, on Iron Mountain, produces auriferous iron ore, ying circa 60% iron and $2 to $8 gold per ton, with an estimated average value of $3 to $4. It is planned to reach the Iron Mask by a railroad spur.

The Garnet mine, taken over early 1908, has a 480′ shaft, equipment in- ing a 20-h. p. gasoline engine and an air-compressor.

The mining plant includes three 85-h. p. boilers, two 8x10″ hoists, good for each, and 2 Sullivan air-compressors, of 28 drills aggregate capacity, with power drills.

Buildings are 22 in number, including 4 smithies, a 20x40′ machine-shop, eral store, office, assay office and laboratory. The townsite of Orogrande electric light and a telephone exchange, maintained by the company.

Water is brought, 21 miles, from a dam across the Sacramento river, in Sacramento Mountains, by a 6″ pipe-line, leading to a 25,000,000-gallon rvoir, on the side of Baird Hill, just above the townsite of Orogrande. The y flow of the river is said to be 10,000,000 gallons, and the capacity of the e-line is circa 500,000 gallons daily, delivering water at about 800 lbs. sure per square inch, under a static head of 1,500′.

The smeltersite, less than a mile from Jarilla Junction, is about 1½ miles n the mine, and includes ore-bins, sampling mill, furnace building and er-house. The furnace building, of steel, is designed for two 250-ton fur- s, with equipment in place for both, but only one furnace is installed, this ing been blown in early November, 1907. The furnace building has a 125′ l smokestack, of 14′ diameter at the base and 9′ at the top. The smelter eached by a private spur track from the El Paso & Northeastern Railroad, is connected by a branch line with the mines.

The smelter power plant has three 150-h. p. Heine boilers, two 120-h. p. r & Stowell Corliss high-speed engines, 2 Hendrie & Bolthoff electric gen- ors and two No. 8 Connersville blowers.

The company formerly employed about 200 men, and made its first matte ment to Chrome, N. J., in July, 1907, but suspended operations May, 1908, n Geo. J. Green, the president, was appointed receiver, in a friendly action. plant was idle at the end of 1908.

TH YALE COPPER CO., LTD. **BRITISH COLUMBIA.**

Mine office: Grand Forks, Boundary district, B. C. Frederick Keffer, ager. Organized January, 1905, under laws of British Columbia, with capi- ation $450,000, shares $1 par. Apparently property was a bond and lease he Sunset group.

TH YUBA MINING & SMELTING CO. **CALIFORNIA.**

Mine office: French Corral, Nevada Co., Cal. Presumably idle.

EREIGN CONSOLIDATED COPPER CO. **OREGON.**

Office: Baker City, Ore. Mine office: Sparta, Baker Co., Ore. W. G. ding, president; John Arthur, vice-president; Kenneth O. McEwen, secre- ; J. W Patterson, treasurer; preceding officers and John Ramb, directors. nized Dec. 5, 1907, under laws of Oregon, with capitalization $2,000,000. s, 12 claims, area circa 200 acres, on Coin Creek, in the foothills of the Mountains, showing a mineralized zone of about 200′ width, traceable on the company's lands.

SOVEREIGN COPPER MINING CO. WYOMING.

Dead. Formerly at Battle, Carbon Co., Wyo.

SPANISH-AMERICAN FEDERAL SMELTING & REFINING CO. ARIZONA.

Office: 11 Buckler Bldg., El Paso, Tex. Mine office: Nogales, Santa Cruz Co., Ariz. J. V. Smith, president; F. A. Schneider, general manager; J. P. Stapleton, attorney. Organized circa January, 1908. Property apparently is the idea of building a 1,200-ton smelter at Nogales, and company apparently is a replica of the Pan-American Smelting & Refining Co., and is not regarded favorably.

SPANISH COPPER CO., LTD. SPAIN.

Office: 2 Tokenhouse Bldgs., London, E. C., Eng. Mine office: San Vicente, via Paimogo, Huelva, Spain. G. B. Mee, chairman; Miguel Yglesias, managing director. Organized June 8, 1883, with capitalization £150,000, shares £10 par; issued £110,000.

Lands, 16 claims, area upwards of 400 acres, 6 claims, area 200 acres, perpetual leasehold, being held on an annual rental of £400, also 23 acres miscellaneous lands, in the Paimogo district of Huelva, showing 6 contact veins between porphyry and clay-slate, of which 3 are developed, these averaging 20′ width and 500′ length, opened by numerous shafts of 30′ to 165′ depth, and 14 tunnels, longest 1,840′, estimated to show 2,500,000 tons of ore, with 100,000 tons blocked out for stoping. Ore is mainly cupriferous pyrite, claimed to average about 4% copper, 3 oz. silver and $2 gold per ton. Mines, first opened by the Phœnicians, were reopened 1862, and again in 1872, 1883, 1901 and 1905. The Guadiana railroad is 5 miles distant.

SPANISH MINERALS DEVELOPMENT, LTD. SPAIN.

Dead. Was succeeded, Feb. 14, 1908, by Esperanza Copper & Silver Co., Ltd. Formerly at Almonáster, Huelva, Spain. Described Vol. VI.

SPAR COPPER MINES & TUNNEL CO. COLORADO.

Office: care of F. N. Stiles, president and general manager, Denver, Colo. E. A. Stiles, secretary; F. W. Downs, treasurer. Organized June 17, 1904, under laws of Colorado, with capitalization $600,000, shares $1 par. Lands, 9 claims, on Contact Mountain, Tomichi district, Gunnison county, Colorado, formerly known as the Morning Glim, having circa 1,500′ of workings, with gasoline power and 3 mine buildings. Is said to have produced upwards of $75,000 worth of ore, in the past. Presumably idle.

SPAR GOLD & COPPER CO. ARIZONA.

Dead. Lands sold, circa 1908, to Pocahontas Copper Queen Mining Co. Formerly at Mayer, Yavapai Co., Ariz.

SPARTA MINING & DEVELOPMENT CO. OREGON.

Office: care of Chas. P. Caffrey, Logansport, Ind. Mine office: Sparta, Baker Co., Ore. Lands, 15 claims, including the Blue Boulder group, 3 miles south of Sparta, having a vein of about 100′ width, opened by a 75′ tunnel and several pits of 10′ to 20′ depth, showing auriferous copper ore.

SPASSKY COPPER MINE, LTD. SIBERIA.

Office: 60 London Wall, London, E. C., Eng. Mine office: Spassky Zavod, Akmolinsk, Siberia. Arthur Fell, M. P., chairman; Ernest Carnot, vice-chairman; John A. Clark, secretary; Herbert C. Wolmer, general manager; R. E. V. Vinicombe, mine superintendent; R. McLeod Percy, colliery superintendent; F. C. Knight, smelter superintendent; Pellew, Harvey & Fell, consulting engineers.

Organized July 9, 1904, under laws of Great Britain, with capitalization £300,000, shares £1 par, fully issued. Debentures, £300,000, at 6%, retiring former first-mortgage debenture issue of £100,000 at 5%, and a £30,000 second mortgage issue at 6%. Company authorized, March, 1908, an increase of

capitalization to £500,000, to provide for the conversion of the new issue of £300,000 debentures into shares, at £3 per share, until Jan. 1, 1912.

Lands, 100 square miles, on the Ishim river, an affluent of the Irtish, in the Kirghiz Steppe, circa 250 miles south of Petropavlovsk, on the Siberian railway, which is the nearest railroad point. Property includes about 25 square miles of coal lands, carrying 4 seams of bituminous coal, said to be of excellent grade. Lands of the company also carry gold, iron and limestone, and include the Yuspensski mine and the Spassky smelter.

The Yuspensski mine was opened 1864, closed 1884, reopened 1896 and bought by present company, 1904. Original development was by an open pit, once 150' deep, but long since caved in.

The Yuspensski shows a network of veins, at and near the contact of slate and arcose, in sedimentaries of Permian age. The 2 main veins, known as the Annensky and Vladimir, are circa 200' distant and substantially parallel, hence it is thought they may join at depth. The mine has been tested by diamond drill borings, to a depth of 475', ore in bottom of holes assaying up to 67% copper. Principal development is on the Annensky vein, which is 10' to 60' in width, carrying mainly chalcocite and bornite, with small quantities of chalcopyrite and occasional tetrahedrite, with gangue of quartz and barite, estimated by company to average 12 to 20% in copper tenor. The upper workings show some native copper, cuprite, azurite and malachite.

The mine has 35 old shafts, mainly shallow and in extremely bad condition, the mining practice of the former owners having been of the most primitive nature, timbering costs averaging $1.25 per ton of ore mined, and timber being subject to frequent crushes, owing to bad mining, after which new timbers were installed inside of the old, with the result of eventually reducing the mine openings to impassable dimensions. New development, by present company, includes 6 shafts, of 350', 375', 300', 150', 120' and 150'. The 350' main shaft, known as the Annensky, is sunk in the footwall and connected with the veins by crosscuts. The bottom level, at 350', shows a vein of 38' extreme and 15' average width, giving ore of 10 to 40% copper tenor, with an average, from actual smelting returns, of 21.77%. This vein apparently is merely the paystreak of an ore body of immense width, a crosscut on the 300' level showing, in addition to the paystreak, 651' width of vein matter, carrying declining copper values, with a tenor of circa 1% copper only, at the end of the crosscut, hence it is probable that much of the vein hitherto untouched, may be found workable, eventually. At one point the former owners had extracted chalcopyrite, leaving a wall showing slickensides of what they considered slate, but which, upon investigation, by the present management, proved to be a vein of massive chalcocite. Ore developed is estimated at about 175,000 long tons, of circa 15% average copper tenor.

The old equipment at the mine, of a most primitive nature, has been replaced by a 700-h. p. steam plant, with a 50-h. p. hoist, good for 1,000' depth, and a 10-drill straight-line air-compressor. Buildings include a 50x100' stone machine-shop, 20x30' smithy, a variety of miscellaneous mine buildings, and dwellings for workmen, constituting a small town. The company maintains schools, baths, hospital and a church, for workmen and their families.

The coal mine, about 26 miles from the smelter, shows 2 seams of 60" and 65" thickness, and yields about 60,000 long tons of coal yearly, for the company's requirements, in addition to production for commercial uses. A coking plant, with beehive ovens, has been constructed.

The company has a 26-mile private railway, known as the Spassky-Karandy line, of 600-mm. gauge, equipped with 5 locomotives and 75 cars.

Transportation between the mine and smelter, a distance of 70 miles, is

by team, a traction engine and ore-wagons bought for the purpose apparently having proven unsuitable. Under the old management ore was carried in carts, but so much ore was lost in transit that the track of the ore-carts remains emblazoned by a purple train of bornite, visible for several miles. The Russian government is said to plan building the Orenburg-Akmolinsk-Semipalatinsk railway to pass near the company's copper and coal mines, and consideration has been given to the matter of organizing a subsidiary company, to construct a railway between the mine and smelter.

The former smelting practice, under previous ownership, scarcely could have been improved on for badness. The ore was heap-roasted with coal, the process requiring 3 weeks, and as the heaps were located on the top of a hill, where furious winds prevailed, there was much cintering and heavy losses. The old smelter had 6 rectangular brick furnaces, of 2½ tons daily capacity each, and so poor was the former practice that a smelter charge of 16 tons of ore required 54 tons of fuel and flux for its reduction. Matte was run onto the casting floor, of sand, with frequent pools of water, causing serious explosions, and only about half of the matte was removed by tapping, the balance being dug out by hand. The slags run about 3% copper, and were fed back into the furnace repeatedly, until gradually worn out.

The old smelting plant, which was poorly designed, in bad condition and remarkably inefficient, has been patched up and improved, but remains far from modern. The capacity is reported, by the company, as 80 to 100 tons daily. Equipment includes 8 small Raschette blast-furnaces and seven 5-ton reverberatory furnaces, the works being designed for a capacity of 300 long tons fine copper monthly. The converter department has a 20-ton electric traveling crane and one stand, with shells of the Anaconda type, treating matte of 58% copper tenor, and turning out blister copper averaging 99% copper, 20 to 40 oz. silver and 0.4 oz. gold per ton. There is an electrically driven quartz mill for preparing converter linings.

The smelter power plant includes a 700-h. p. steam installation, 150-h. p. electric plant and a 150-h. p. air plant, with 2 Connersville blowers and a Bessemer blowing engine.

Considerable trouble was had with labor, and forces were changed, 1907. Production, Aug. 1, 1904, to Sept. 30, 1906, was 1,784 long tons fine copper, and July, 1907, was said to be 74 long tons fine copper. Production, 1907, is estimated at 1,750,000 lbs. fine copper. The company was claimed to have made a profit of £33,000 on the first 15 months' operations, but was compelled, a little later, to raise additional capital. The property is one of very great promise, but, owing to lack of adequate transportation facilities, labor troubles and other difficulties, its development to a point commensurate with its promise is likely to require some years.

SPECULATOR MINE. **MONTANA.**

Owned by North Butte Mining Co.

SPECULATOR MINING CO. **MONTANA.**

Office: Butte, Mont. Mine office: Clinton, Missoula Co., Mont. John A. Creighton, president; John Dougherty, vice-president and general manager. Property, near Clinton, includes the Black Hawk group, and options on adjoining lands. The Black Hawk is developed through the Cape Nome shaft, which this company sunk 200', to the 500' level. Company formerly owned the Speculator group, at Butte, sold, 1905, to the North Butte Mining Co. Former holdings, now owned by North Butte, were fully described Vol. V.

SPENCE & CO. **OREGON.**

Office and mine: Kerby, Josephine Co., Ore. Dr. Jas. Spence, general

manager; C. W. Spence, superintendent. Lands, 11 claims, area 220 acres, 40 miles from a railroad, showing diorite and porphyry, carrying 4 veins, under development, estimated at 4' to 100' width, opened by 7 tunnels, of 40' to 800' length, showing cuprite, melaconite, malachite, azurite and chalcopyrite, mainly the latter, giving assays of 3 to 20% copper, 1 to 6 oz. silver and $1 to $10 gold per ton. Property is being developed slowly, with a small force, but is kept out of debt.

SPENCE MINERAL CO. **CALIFORNIA.**

Office: San Francisco, Cal. Mine office: Spenceville, Nevada Co., Cal. Chas. W. Howard, Jr., general manager. Property is an old mine, operated since circa 1875, until main shaft caved in, 1903. Ores are auriferous and argentiferous sulphides, averaging about 5% copper and 45 to 50% sulphur, occurring in wide, irregular fissures, near the contact of diorite and granodiorite. Idle.

SPENAZUMA COPPER CO. **ARIZONA.**

Dead. Was a fake, promoted by Dr. R. C. Flower. Formerly at Duncan, Graham Co., Ariz.

SPIRIT LAKE POWER & MINING CO. **WASHINGTON.**

Office and mine: Chehalis, Lewis Co., Wash. R. C. Lange, secretary and general manager. Lands are said to show auriferous and argentiferous copper ores.

SPITZEE GOLD MINES, LTD. **BRITISH COLUMBIA.**

Dead. Reconstructed, August, 1905, as Spitzee Mining Co., Ltd. Formerly at Phœnix, Boundary district, B. C.

SPITZEE MINING CO., LTD. **BRITISH COLUMBIA.**

Mine office: Phœnix, Boundary district, B. C. Organized 1905, under laws of British Columbia, with capitalization $350,000, shares $5 par, as successor of Spitzee Gold Mines, Ltd. Lands, 110 clams, area circa 5,500 acres. Property produced, to September, 1905, circa 5,000 tons of ore, averaging $12 per ton in value, and was said, at that date, to have circa 30,000 tons of ore in sight. Bonded, 1907, to LeRoi Mining Co., Ltd. Idle, except for diamond drilling, at last accounts.

SPOKANE-ALASKA MINING CO. **ALASKA.**

Office: Spokane, Wash. Mine office: Ketchikan, Alaska. Wm. F. Newton, president and general manager. Lands, 15 claims, held under bond and lease, including the Sanford group, at Dahl Head, showing promising auriferous copper ore.

SPOKANE COPPER CO. **WASHINGTON.**

Dead. Formerly at Cle-Elum, Kittitas Co., Wash.

SPOKANE-MONTANA MINING & MILLING CO. **MONTANA.**

Office: Spokane, Wash. Mine office: Iron Mountain, Missoula Co., Mont. Organized circa 1907, under laws of Idaho, with capitalization $1,000,000, by Michael Luxemburger, W. McCracken and others. Lands are said to show auriferous and argentiferous copper sulphides, at shallow depth.

SPRAGG MINE. **NEVADA.**

Owned by Mason Valley Mines Co.

SPRAGUE COPPER MINING CO. **WASHINGTON.**

Office: Spokane, Wash. Mine office: Chewelah, Stevens Co., Wash. Dr. L. E. Schlegel, manager. Property is said to show, at depth of 65', a 3' vein carrying copper, gold and silver values. Company plans a 100' tunnel.

SPRINGDALE COPPER MINING CO. **OREGON.**

Mine office: Athena, Umatilla Co., Ore. Idle and apparently moribund.

SPRINGFIELD GOLD & COPPER MINING CO., LTD. **IDAHO.**

Office: 720 Bank St., Wallace, Shoshone Co., Idaho. Mine office: Mullan, Shoshone Co., Idaho. Wm. Lively, president; D. A. McKenzie, vice-president

and manager; Jos. T. Whelan, secretary; John Jecklin, superintendent. Capitalization $100,000, shares 10 cents par. Lands, 4 claims, patented, area 80 acres, well timbered, on Stevens Peak, in the St. Joe district, opened by tunnels, longest a crosscut adit of 1,700', which, at 1,400', cuts a 25' vein of copper ore below commercial grade. The upper tunnel shows chalcopyrite assaying up to 33% copper, with good gold values, and small shipments have been made.

SPRINGFIELD-MEXICAN MINING CO. MEXICO.

Office: 213½ South Sixth St., Springfield, Ills. Mine office: Unión de Tula, Autlán, Jalisco, Mex. Geo. F. Stericker, president; Geo. M. Morgan, vice-president; Harvey C. McCann, secretary; Alfred Orendorff, treasurer; Gerald G. Hereford, superintendent; Arthur Hay, engineer. Organized June 3, 1903, under laws of Arizona, with capitalization $500,000, shares $1 par.

Lands, 25 hectares, 6 miles south of Ayutla, including the Concepción group, showing 3 veins, of 4' average width, with circa 1,000' of workings. The various properties of the company show fissure veins in porphyry, of 7' average width, carrying malachite, azurite, bornite and chalcopyrite, giving average assays of 7% copper and 12 oz. silver per ton. Has shafts of 220', 58', 86', 97', 100' and 175', and 8 tunnels, 2 longest 258' and 340', estimated to show 10,000 tons of ore blocked out for stoping. Property is an antigua, closed 1821, reopened 1903. Equipment includes a 30-h. p. steam plant and 6 mine buildings. Nearest railroad, 40 miles, is the Mexican Central. Presumably idle.

SPRING GULCH GOLD MINING CO. COLORADO.

Mine office: Idaho Springs, Clear Creek Co., Colo. J. B. MacFarlane, superintendent, at last accounts. Property is the Bauty group, carrying auriferous and cupriferous silver-lead ores. Has gasoline power. Idle.

SPRUCE MOUNTAIN COPPER CO. NEVADA.

Mine office: Sprucemont, Elko Co., Nev. Is said to employ 25 men. Lands, adjoining the Latham, show ore assaying up to 40% in copper tenor, and mine was producing some ore, August, 1908, through P. A. Cole, lessee. Production, 1907, returned as 1,338,198 lbs. fine copper.

STADTBERGER HÜTTE ACTIEN GESELLSCHAFT. GERMANY.

Office: Köln, Germany. Mine office: Nieder Marsberg, Westfalen, Germany. Otto Meurer, president; Anton Hamers, vice-president; Erich Meurer, mining engineer. Organized 1872, under laws of Germany, with capitalization 2,250,000 marks, shares 600 marks par. Paid dividends, to Dec. 31, 1907, of 112,500 marks.

Lands show fissure veins in argillaceous schist, carrying ore estimated to average 1.5% copper. The property, formerly operated by the Stadtberger Gewerkschaft, was discovered circa A. D. 800, and has been working, with few idle intervals, since A. D. 1150. Property includes 3 mines, the Mina, Friedcrike and Oscar, latter idle, all three opened by new deep shafts.

Equipment includes a 400-h. p. steam plant and a 60-h. p. water plant.

The reduction plant includes a concentrator, smelter and 1-ton electrolytic refinery, latter treating argentiferous cement copper. Ore is reduced mainly by wet process. Production has been as follows: 1,609,358 lbs. in 1905; 1,388,898 lbs. in 1906; 1,322,760 lbs. in 1907, latter secured from 42,000 metric tons of ore treated.

STANDARD CONSOLIDATED COPPER CO. ARIZONA.

Office: 43-52 Wall St., New York, N. Y. Mine office: Clifton, Graham Co., Ariz. John K. Erskine, Jr., president; M. Gould, secretary and treasurer; preceding officers, John F. Brooks, Geo. Frazer and Smith Lent, directors; Geo. H. Dudley, manager. Organized 1903, under laws of Maine, with capitalization $1,500,000, shares $10 par. Is a holding company, controlling various subsidiary corporations through stock ownership. Shareholdings include $292,515 of the capital stock of the Standard Copper Mines; $700,000, or 70% of the

capitalization, of the Clifton Copper Mines, Ltd., and 26,107 shares of the capital stock of the Coronado Mining Co., control of latter being held by Shannon Copper Co. The Standard Consolidated Copper Co. owns the Standard, San José, Copper Centre and Los Angeles mines.

Lands owned and controlled by the company are all more or less contiguous, lying on both sides of Chase Creek, for 1½ miles, on the line of the Coronado railroad, 5 to 6 miles north of Clifton, the Standard mine being in the centre, flanked by the Clifton and San José groups.

The Standard mine, 5 claims, area 99 acres, is developed mainly open-cast, with upwards of one mile of underground workings, on a vein of 2′ to 4′ width, carrying ores of 3 to 60% copper tenor, with an average smelter return of circa 20%.

The Coronado group of 7 claims, adjoining the Standard mine, is supposed to carry a continuation of the Standard ore body.

The San José group of 3 claims, patented, area 48 acres, lying west of the Standard group and south of the King mine of the Arizona Copper Co., Ltd., is about one mile east of Metcalf, showing a 4′ to 5′ vein of chalcocite, of high average assay tenor. This property, slightly developed, is a small producer.

The Copper Centre group of 8 claims, partly patented, has a 280′ shaft showing a 3′ vein of chalcocite, giving assays of 30 to 40% copper.

Los Angeles group, 4 claims, area 80 acres, about 2 miles from the San José group, and near Morenci, is developed by a 110′ shaft and a 225′ tunnel.

Buildings include an engine-house, smithy, office, laboratory, boarding-house, general store, stable and several buildings. Mine equipment includes a gasoline hoist.

The ore from the Standard mine is taken to the Coronado railroad by a 3,200′ Leschen aërial gravity tram, with drop of 800′, which transports ore at an average cost of circa 5 cents per ton, as against a previous charge of $2 per ton, when shipped by burros. The tram-line has shipping-bins at the lower terminal, on the railroad tracks.

Ore, formerly shipped to the Shannon, has gone to the Detroit smelter since 1906. Production has been as follows: 1,088,952 lbs. fine copper and 2,620 oz. fine silver, of which 31,853 lbs. copper came from the San José and 37,517 lbs. copper came from the Clifton mine, in 1905; 78,097 lbs. fine copper and 4,717 oz. silver in 1906; 497,286 lbs. fine copper in 1907.

The company, under former management, began dividends before such disbursements were warranted, and much trouble arose from quarrels among the directors, but apparently matters are harmonious again, and the property is considered meritorious.

STANDARD CONSOLIDATED MINES CO. **OREGON.**

Office: Sumpter, Ore. Mine office: John Day, Grant Co., Ore. D. M. Campbell, president; Edw. W. Mueller, secretary; C. B. Wade, treasurer; H. H. Nicholson, manager. Organized May, 1903, under laws of Arizona, with capitalization $5,000,000, shares $1 par.

Lands, 26 claims, area circa 500 acres, on both sides of Dixie Creek, in the Quartzburg district, showing auriferous ores of copper, nickel and cobalt. The mine is said to have about 2 miles of workings, and equipment includes a 50-ton concentrator. Some ore was shipped, 1906. Presumably idle.

STANDARD COPPER CO. **ARIZONA.**

Mine office: Casa Grande, Pinal Co., Ariz. Lands, 7 claims, 13 miles from Casa Grande. Idle several years and apparently moribund.

STANDARD COPPER CO. **UTAH.**

Dead. Changed name, 1906, to Bingham Standard Copper Co. Formerly at Bingham Canyon, Salt Lake Co., Utah.

STANDARD COPPER CO. OF ARIZONA. ARIZONA.

Office: 520 Chamber of Commerce, St. Louis, Mo. Location of lands, if any, unknown.

STANDARD COPPER MINES. ARIZONA.

Office: 52 Wall St., New York, N. Y. Mine office: Clifton, Graham Co., Ariz. John K. Erskine, Jr., president; M. Gould, secretary; G. H. Dudley, manager. Organized Feb. 21, 1901, under laws of Arizona, with capitalization $500,000, shares $1 par; issued, $425,000. Is controlled by the Standard Consolidated Copper Co., through ownership by latter of $292,515 of issued stock. Paid dividends, to end of 1905, of $69,500. Lands, 99 acres. Buildings include an engine-house, office, laboratory, smithy, boarding-house, stables, etc.

STANDARD COPPER MINES CO. ALASKA.

Office: 68 William St., New York, N. Y. Mine office: Landlock, Alaska. Employs circa 15 men. Morris B. Mead, president; John L. Steele, vice-president and engineer; E. F. Bourke, secretary; J. O. Molander, treasurer; Jas. A. Bourke, general manager; preceding officers, Thos. R. Manley and Chas. Williams, directors. Organized Feb. 2, 1906, under laws of New Jersey, with capitalization $300,000, shares $100 par; issued, $220,000. Bonds, $300,000 issued. Cash on hand, Sept. 17, 1908, was $30,000. Annual meeting, third Saturday in December.

Lands, 13 claims, area 260 acres, also a 14-acre millsite, in the Valdez district, showing greenstone, carrying 17 fissure veins, of which 4, under development, carry chalcopyrite, estimated to average 6% copper, 1 oz. silver and 90 cents gold per ton. Mine is opened by tunnels of 260′, 80′ and 460′, estimated to show 20,000 tons of ore, with 12,000 tons blocked out for stoping.

The mine is connected with 500-ton ore-bunkers on a wharf at tidewater by a 3,300′ aërial tram, in two sections, one of 912′ and one of 2,526′ length. Production, 1907, was circa 1,000 tons of 6% ore, yielding 120,000 lbs. fine copper. Company is operated as a close corporation, and seems developing along businesslike lines.

STANDARD COPPER MINING CO. MONTANA.

Office: care of A. M. Stevens, Higgins Block, Missoula, Mont. Organized 1907, under laws of Montana, with capitalization $1,000,000, shares $1 par.

STANDARD COPPER MINING CO. WASHINGTON.

Mine office: Bolster, Okanogan Co., Wash. J. W. McBride, Jas. Caughran, Patrick Welch, E. Garlinger and Fred N. Freer, directors. Lands are on Copper Mountain, in the Myers Creek district. Presumably idle.

STANDARD COPPER MINING CO. WYOMING.

Office: 1212 Nicholas Bldg., Toledo, Ohio. Mine office: Encampment, Carbon Co., Wyo. Geo. P. Waldorf, president; Alphonse Mennell, vice-president; Jos. M. Spencer, secretary and treasurer; Chas. E. Winter, managing director; preceding officers, Fred O. Paddock, Harvey M. Cook, John H. Lloyd, John D. Dorn and John A. Scott, directors; A. H. Oldman, mine superintendent. Organized August, 1903, under laws of Wyoming, with capitalization $1,500,000, shares $1 par.

Lands, 10 claims, including the Susquehanna group of 6 patented claims, area 120 acres, about one-half mile east of the Itmay mine, carrying sundry contact and fissure veins, of 10′ estimated average width, including a vein of 40′ claimed width, opened by 7 pits and shafts of 10′ to 207′ depth, showing azurite, malachite, chalcocite, bornite and chalcopyrite, giving assays up to 18% copper and $2 gold per ton, with small silver values. Has a 600′ hoist and 5 buildings. Idle since Dec. 16, 1905.

STANDARD COPPER MINING & REDUCTION CO. MONTANA.

Office: 109 East Broadway, Butte, Mont. Mine office: Divide, Silver Bow Co., Mont. John H. Lynch, president; C. W. Siglar, vice

ident; D. C. Campbell, secretary and treasurer; preceding officers, G. D. ridge, C. J. Fellows, F. C. Geiger and C. Woltjen, directors. Organized , under laws of District of Columbia, with capitalization $1,000,000, shares ar. Lands, 5 claims, in the Fleecer Mountain district, circa 25 miles south of Butte and 5 miles from Divide, with a good wagon road to latter point. erty has 2 shallow shafts, showing ores giving good assay values in copper. several years and apparently moribund.

NDARD COPPER PYRITES CO. **ALABAMA.**

Office: 1309 Brown-Marx Bldg., Birmingham, Ala. Mine office: Pyriton, Co., Ala. Robt. Ross Zell, president; J. C. Clark, vice-president; G. John- treasurer; J. D. Stagg, secretary. Capitalization, $50,000. Lands show a ore body, giving assays up to 6% copper and carrying 42 to 46% sulphur. probable that copper values will decrease at slight depth, but property d prove valuable for its sulphur ores alone.

NDARD DEVELOPMENT CO. **COLORADO & CALIFORNIA.**

Office: 52-240 La Salle St., Chicago, Ills. W. A. McGuire, president; C. N. n, vice-president; R. J. Jennings, second vice-president; J. Jennings, gen- manager; E. C. Boisot, secretary and treasurer. Capitalization $10,000,000, s $1 par. Supposedly controls, throug stock ownership, Grand Re- Mining Co. and Mount Zirkel Mining Co., of Larimer county, Colorado, apparently are moribund. Is said also to own the Jennie "group," of res, on the McCloud river, in Shasta county, California. Company ap- tly is merely a stock-jobbing enterprise.

NDARD GOLD & COPPER MINING CO. **OREGON.**

lead. Absorbed, 1903, by Standard Consolidated Mines Co. Formerly at Day, Grant Co., Ore.

NDARD MAGDALENA MINES CO. **MEXICO.**

ffice: Los Angeles, Cal. Mine office: Nogales, Magdalena, Sonora, Mex. 107′ shaft.

NDARD MINES CO. **CALIFORNIA.**

ffice: 318 Grant Bldg., Los Angeles, Cal. Mine office: Cima, San Ber- o Co., Cal. John W. Kemp, president; Frank S. Adams, secretary; pre- officers and R. R. Patterson, directors. Lands, 11 full and several frac- claims, 10 miles north of Cima, having a 356′ shaft, with circa 2,000′ of ngs, showing carbonate ores near surface, with melaconite and sulphide ores on the 100′ level. Shipped, 1906, to Salt Lake smelter, 81 carloads, ing an average of circa 10% copper, 5 oz. silver and $2 gold per ton. ction, 1906, estimated at 250,000 lbs. Property considered promising.

NDARD MINING CO. **IDAHO.**

ine office: Silver City, Owyhee Co., Idaho. F. M. Clemens, superintend- Has lead and copper ores, presumably argentiferous, with steam power, ying circa 20 men, at last accounts.

NDARD PYRITIC SMELTING CO., LTD. **BRITISH COLUMBIA.**

ead. Formerly at Greenwood, Boundary district, B. C.

LEY BUTTE CONSOLIDATED COPPER CO. **ARIZONA.**

ffice: 601-17 St[illegible]., New York, N. Y. Mine office: San Carlos, Gila riz. Jas. E. Carpenter, general manager; Harry Pryor, superintendent. , 60 claims, held under bond and lease, having a 125′ tunnel. Presumably

LEY MINES CO. **COLORADO.**

ice: 305 Colorado Bldg., Denver, Colo. Mine office: Idaho Springs, Creek Co., Colo. Arthur G. Brownlee, president and general manager; M. Jackson, superintendent. Organized, circa 1906, as successor of the lidated Stanley Mining & Milling Co. Lands, circa 90 claims, showing

auriferous and argentiferous lead and copper ores. Has steam and water power and 10-stamp mill, employing about 40 men, at last accounts.

STAR CONSOLIDATED MINING CO. UTAH.

Dead. Merged, 1907, in Black Jack Consolidated Mining Co. Formerly at Park City, Summit Co., Utah.

STAR COPPER MINING CO. MICHIGAN.

Office: care of John C. Watson, 68 Devonshire St., Boston, Mass. P. H. Raymond, president; C. O. Burbank, secretary and treasurer. Lands, circa 760 acres, in Sections 9, 10 and 16, Town 58 North, Range 28 West, Keweenaw county, Michigan. Has 2 shafts, deepest 300', on a fissure vein, south of the greenstone, sunk 1851-1857, when company expended circa $70,000. Idle since 1857.

STARLUS COPPER & GOLD MINING CO.

Dead. Formerly had an office at 215 Dearborn St., Chicago, Ills.

STATE COMMERCIAL DEVELOPMENT CO. MONTANA.

Letter returned unclaimed from former office and mine, Butte, Silver Bow Co., Mont. J. E. Wharton, president. Lands are claims north of Butte. Idle and apparently moribund.

STATE LINE COPPER MINING CO. WYOMING.

Dead. Reorganized, circa 1904, as State Line Mining Co. Formerly at Encampment, Carbon Co., Wyo. Described Vol. IV.

STATE LINE MINING CO. WYOMING.

Office: 300 Century Bldg., Denver, Colo. Mine office: Encampment, Carbon Co., Wyo. D. W. Aupperle, president; Hon. S. M. Elwood, vice-president; W. W. Wemott, secretary and treasurer. Organized, circa 1904, with capitalization $1,500,000, shares $1 par, as a reconstruction of the State Line Copper Mining Co. Lands, 17 claims, area 340 acres, near the Colorado line, showing a 3' vein of ore, giving assays of 21% copper, from 17 pits and shallow shafts of 10' to 60' depth. Company started a crosscut tunnel and apparently is in controversy with an adjoining company, over titles. Idle.

STAUFFER CHEMICAL CO. CALIFORNIA.

Office: San Francisco, Cal. Mine offices: Kennett, Shasta Co., Cal., and Oakland, Alameda Co., Cal. Chas. E. Kunze, manager; Geo. F. Graves, superintendent. Oakland property, 80 acres, known as the Alma mine, developed mainly by tunnels, produces cupriferous pyrite, carrying 1.5 to 3.5% copper, up to 50% sulphur, and up to $2.50 gold per ton, occurring in lenses between serpentine and metamorphosed chert, in a belt traced 3,000'. The Shasta county property is the Summit group, lying northwest of the Mammoth, in the Backbone district, taken over, 1908, under bond and lease, from the Phœnix Security Co.

STEAMBOAT MINING CO. UTAH.

Mine office: Brighton, Salt Lake Co., Utah. Idle several years.

STEAMBOAT MINING & MILLING CO. COLORADO.

Mine office: Steamboat Springs, Routt Co., Colo. Lands, in the Copper Ridge district, show a 30' vein, carrying a narrow paystreak of high grade copper ore.

STEMP SPRINGS COAL & POWER CO. WYOMING.

Office: 55 High St., Oshkosh, Wis. Works office: Copperton, Carbon Co., Wyo. Employs 35 men. E. E. Mellens, president; Henry L. Larsen, vice-president; H. O. Granberg, secretary, treasurer and general manager; preceding officers, M. Brinton and J. S. Armstrong, directors; E. M. Sanders, superintendent; J. H. Glazier, mine superintendent; O. C. Finkelnburg, engineer. Organized Nov. 21, 1905, under laws of Wyoming, with capitalization $250,000, shares $1 par. Company reported, September, 1908, having $20,000 cash on hand, with no liabilities.

Lands, 762 acres, patented, being 640 acres of coal lands and 122 acres of r lands, latter including a smelter site, in the Battle Lake district. Cop- roperty shows fissure veins in schist and contact deposits between diorite quartzite, of which one, of 11′ estimated average width, traceable circa ', carries copper-nickel sulphides, opened by a 155′ shaft and a 273′ tunnel. coal lands carry 3 beds of coal, of 3′ to 6′ thickness, at intervals of circa A 15′ waterfall is leased, for 20 years, from the Jackpot Mining Co., privilege of renewal. Equipment includes a 40-h. p. steam plant at the , with a 3-drill Ingersoll-Sergeant air-compressor. Buildings include a 0′ log machine and carpenter shop and a 16x24′ smithy.

The smelter, 20 miles from a railroad, has a 60-ton McDonald furnace, ned to turn out 50% matte, or pimple metal of about 80% copper tenor. smelter has a 100-h. p. steam plant. Company plans continuous develop- and blowing in the smelter.

MWINDER MINE. **BRITISH COLUMBIA.**

Owned by Dominion Copper Co., Ltd.

PHENSON-BENNETT CONSOLIDATED MINING CO. **NEW MEXICO.**

Office: 515 Keith & Perry Bldg., Kansas City, Mo. Mine office: Organ, a Ana Co., N. M. J. I. McCullough, president and general manager; C. B. vice-president; S. Lehman, secretary; F. M. Johnson, treasurer; preceding rs, G. A. Chapin, T. S. Semple and H. B. Holt, directors; Hugh Yale, mine nan. Organized 1889, under laws of New Mexico, and capitalization since ased to $2,000,000, shares $1 par.

Lands, 17 claims, 2 miles south of Organ, in the Organ Mountains, 15 miles the Santa Fé railway, showing granite and limestone carrying silver veins, ore bodies with strong copper indications, developed by a 350′ two com- nent shaft, and a 2,000′ drainage tunnel. The lower level of the shaft is to show an ore body of 5′ to 40′ width, with a 500′ chute carrying argentif- s and auriferous copper ore.

Equipment includes a steam plant, with 3 boilers, 2 hoists good for 500′ , and a 10-drill Ingersoll-Rand air-compressor.

Buildings include a smithy, engine-house, compressor-house, warehouse, ging-house, boarding-house, office, store and 17 dwellings.

The concentrator, of 50 tons daily capacity, built of wood, has 2 jaw crush- 2 jigs and 4 Wilfley tables.

PHENS PEAL COPPER & GOLD MINING CO., LTD. **IDAHO.**

Mine office: Wallace, Shoshone Co., Idaho.

PTOE LEAD & COPPER CO. **NEVADA.**

Office: care of Wm. H. Tibbals, secretary, Salt Lake City, Utah. Letter rned unclaimed from former mine office, Ely, White Pine Co., Nev. A. J. s, president; J. J. Whittaker, vice-president; H. P. Clark, treasurer; pre- g officers and M. C. McEntire, directors. Organized 1907, under laws of na, with capitalization $1,000,000, shares $1 par. Lands, 4 claims, in the Creek district, northwest of Ely and about 2 miles from the Steptoe er.

PTOE MINING CO. **NEVADA.**

Dead. Property sold, Sept. 4, 1902, to New York & Nevada Copper Co. rly at Ely, White Pine Co., Nev.

PTOE VALLEY MINING & SMELTING CO. **NEVADA.**

Office: 165 Broadway, New York, N. Y. Works office: McGill, White Co., Nev. Silas W. Eccles, vice-president and manager; Thos. Cox, gen- superintendent. Organized circa January, 1907, under laws of Maine, with alization $10,000,000. Is controlled, through joint ownership of shares, vada Consolidated Copper Co. and Cumberland-Ely Copper Co., which are olled by American Smelters Securities Co., which is controlled by Ameri-

can Smelting & Refining Co. Lands and improvements cost $4,115,821.62, end of 1907, and the completed plant is estimated as likely to cost approximately $10,000,000.

Lands are 8 square miles, with water rights pertaining thereto, the company, with great foresight, having secured a large area, in order to prevent damage suits from agriculturists, because of smelter fumes. The lands are on the eastern side of Steptoe Valley, on the slope at the foot of the Schell Creek range, 14 miles northeast of Ely and 22 miles from the mines, on the line of the Nevada Northern railway. The smelter site is 320 acres, in a parallelogram one mile long and one-half mile wide, on a hillside having a grade of about 10%, permitting terracing of the works and handling material by gravity throughout. Lands carry water rights to Duck Creek, on the eastern slope of the hill, also water rights to the McGill ranch, estimated as capable, jointly, of furnishing water for a 25,000-ton plant.

The reduction plant has all main buildings of steel frame, and is excellently planned and equipped. At the end of 1908 the plant was of 4,500 tons daily capacity, but is so designed that it can be increased to an ultimate daily capacity of 20,000 tons.

The ore-bins, of timber, about 300' in length, are in three 6,000-ton units, located about one mile from the smelter. Ore is drawn from the bottom of the bins by belt-conveyors, which take it to small distributing bins, at the head of each section of the mill.

The sampling mill, at the southern end of the yard, has a gyratory crusher, Blake crusher, 1 pair of rolls, 3 Vezin samplers, 1 trommel and 2 conveyors.

The mill, nearly one mile from the smelter, is of steel, 338x567' in size, in terraces, supported by beams of reinforced concrete. The mill is planned to have, eventually, 10 units, first rated at 1,250 tons daily capacity each, and later planned to be of 1,333 tons daily capacity each, but which actually will have an average capacity of nearly or quite 1,500 tons each, giving the mill an ultimate capacity of circa 15,000 tons daily. Three of the 10 units were completed, and in use, at the end of 1908, each being subdivided into a right-hand and left-hand section, each section being 94' 6" wide and 338' 5" long, not including the bins, giving a floor area of about 43 square feet per ton of daily ore capacity. The sections are duplicates and each can be operated independently.

The following description of one section will serve as a description of every section: From the distributing bin ore passes to a trommel having ½" apertures, oversize going to 15x36" rolls and undersize to a ⅝" trommel, the rolls delivering crushed ore to an elevator, which returns the product to the screening system. Ore from the second trommel passes to a second set of 14x36" rolls, which deliver the product to an elevator, while undersize goes direct to an elevator discharging into a trommel of ⅝" size, from which oversize goes back to the second set of rolls, thence returning with the regular flow of material, undersize going to 2-mm. trommels, and oversize to a third set of 14x36" rolls, which deliver their product to an elevator, in the same manner as the second set of rolls. After crushing, the 2-mm. product goes to 8 Richards vortex classifiers, giving coarse and fine products, from 2 spigots, the coarse concentrates being treated by 5 jigs, which make finished concentrates and a hutch-product that is treated on 7 Wilfley tables, which make finished concentrates, and tailings that go to Huntington mills for regrinding. The fine concentrates of the Richards classifiers go to 10 Wilfley tables making finished concentrates, middlings and tailings, the middlings, together with those from the Wilfleys treating coarse concentrates, and the tailings from the jigs, being combined and taken to 3 Callow settling tanks, from which thickened pulp is reground in four 6' Huntington mills, crushing to 60-mesh size. The 60-mesh

m the Huntington mills is elevated to the screening floor, where it verflow from the Richards classifiers, going to a dewatering tank, to five 24" Callow 60-mesh screens, oversize going back to Hunting- or regrinding, and being returned thence to screen, undersize, to- h the overflow from the dewatering tanks, going to a set of 5 The spigot product of the V-boxes goes to 19 Wilfley tables, and the 10 Callow settling tanks, thickened pulp from which is fed to 20 les, the Wilfleys treating the spigot and overflow products, making ncentrates, tailings and middlings, latter retreated, those of the of tables going to 8 Callow tanks, on the vanner floor, giving a pulp eight 6x16′ Frue vanners making concentrates, concentrates from set of Wilfleys going to 8 Callow tanks, thickened product from reated by a second set of eight 6x16′ Frue vanners. Overflow from Wilfley settling tanks, together with that from the first and second ks, goes to a series of 8 tanks for final settlement, these tanks giving which passes to a third set of eight 6x16′ Frue vanners. Concen- n the Wilfley tables and vanners go to 2 tanks, 28′ in diameter and ter draining until tanks are filled. Beneath the tanks are railroad l concentrates are discharged into cars, the tanks being filled and ernately. Concentrates are handled throughout the mill by sluicing unders, and are collected in tanks, and removed therefrom by Blais- tors. Overflow from the mill goes to slum-ponds for settling.

e treated by the mill is friable, hence liable to make an unduly large of slimes, but sliming is obviated, to a considerable extent, by very eening and crushing to 2-mm. size before any jigging is attempted. la Consolidated ores carry an excess of silica, and the Cumberland- carry an excess of iron, giving, in combination, a good furnace he mill was said, July, 1908, to be concentrating Nevada Consoli- about 10 into 1, and Cumberland-Ely ores about 4 into 1, effecting saving of 70% of assay values, raw ores assaying about 2 to 2.5% m the Nevada Consolidated, and 2.5 to 3% from the Cumberland-Ely. alcining department, 228′ in length, of steel frame, has sixteen 18′ roasters, of about 40 tons daily capacity each, which reduce the nor of the ore to about 7.5%. Limestone flux is added to the ores sting, and hot calcines are trammed directly to a reverberatory r, when necessary, to a 1,500-ton brick and steel storage-bin, which a balance-wheel between the calcining and smelting departments. ugall roasters discharge fumes into a double flue, each part of 300 t cross-section and 500′ in length, leading to a brick stack 250′ high, ide diameter.

melter, of about 1,000 tons daily capacity, had 2 units completed and aring completion, with work begun on a fourth, at the end of 1908. er was designed by Walter G. Perkins and constructed under his n. Each group of furnaces has independent flues and chimneys. ne 42x240" blast-furnace, for resmelting converter slags and a small f raw ore, so planned that it can be enlarged, if desired, to 4x80′ in blast-furnace is 13′ above the ground-level, with a height of 16′ from s to the charging floor, operating with a 10′ column charge and 24 blast pressure. The furnace has separate water-jackets with 4 ch with its own blast-box and independent air and water connec- hat any jacket may be removed by breaking three simple connec- arging is done by cars dumped pneumatically, as at the Washoe l matte is tapped into ladles, on cars, for conveyance to the con- artment, slag being granulated and sluiced away.

urnace building has two 19x111′ reverberatory furnaces, with room

for a third, these being of about 250 tons daily capacity each. The reverberatories have 8x19′ grates, and ashes are sluiced to a cinder plant, for recovery of partly burned carbonaceous fuel, similar to that of the Washoe works. Each reverberatory has two 400-h. p. boilers, arranged in parallel, with suitable by-passes, instead of tandem, and each furnace has two charge-hoppers, each with 3 holes, for ore, and one charge-hopper with 4 holes for coal. The reverberatories have a flue of 300 square feet section, 200′ long, doubling back through a dust-chamber of 1,000 square feet section, 200′ in length, leading to a 300′ brick chimney, 15′ in diameter.

The converter building, 120x170′ in size, has 3 stands, operated electrically, with 96x115″ shells, of barrel type, of about 8 tons capacity each. Molten matte from the reverberatories is brought to the converter department in ladles, on cars running on a track behind and above the converters, which are charged through a chute, while the shells remain in position for blast, and silicious ores are charged into shells on the same plan as molten matte. The hoods from the converters lead to a flue of 100′ square section, 200′ in length, running to a 100′ stack of 10′ inside diameter. Blister copper is poured into a conveyor casting machine, which takes the pigs through a cooling tank, and delivers them to a loading platform, above which are air-hoists on a monorail system, for handling the pigs. Converter product is blister copper averaging 99.2% in tenor. Slag is poured into a casting machine, and bricks delivered to a bin, whence taken to the blast-furnace for resmelting, and slag skulls are broken in a 12x24″ Blake crusher, before going to the blast-furnace slag-bin.

The power-house, 136x320′ in size, has eight 400-h. p. Babcock & Wilcox boilers, with American automatic stokers. Equipment includes two 750-kw. and two 1,000-kw. Bullock generators, developing a 600-volt alternating current, used in the works, but stepped up for transmission to the mines. Blowing engines include an Allis-Chalmers 6,000′ blower and a No. 10 Connersville 12,000′ cross-compound blower, both direct-connected to compound condensing Corliss engines. A Laidlaw-Dunn-Gordon air-compressor, of 1,000 cubic feet capacity, furnishes converter blast.

The works have about 12 miles of standard-gauge railroad track, and ore and material are transported by small steam locomotives.

Miscellaneous buildings at the smelter include a 75x160′ car-shop, doing general repairing for the Nevada Northern railway; a machine-shop of steel frame and concrete blocks, a carpenter-shop and warehouse. The administration buildings are arranged in a semicircle facing west, with the general office in the center, supported by a large assay office and laboratory, and flanked by the mess-house and dwellings for heads of departments, the arrangement being pleasing to the eye, as well as eminently utilitarian.

The works were started, on a test run, April, 1908, and the first shipment of finished copper was made in August, in which month production was 1,371,261 lbs. fine copper. For November, 1908, production was 2,963,000 lbs. fine copper, of which the Nevada Consolidated made 1,491,000 lbs. and the Cumberland-Ely 1,372,000 lbs., the Nevada Consolidated ore yielding a net extraction of about 36 lbs. fine copper per ton, and the Cumberland-Ely ores 48 lbs. per ton. The Steptoe works are among the largest and most complete in the world, and are well designed, well equipped and well managed.

STERLING COPPER CO. ARIZONA.

Dead. Formerly at Clifton, Graham Co., Ariz.

STEUBENVILLE & JALISCO MINING CO. MEXICO.

Office: Steubenville, Ohio. Letter returned unclaimed from former post office, Hostotipaquillo, Ahualulco, Jalisco, Mex. Organized 1906, with capitalization $1,000,000. Idle and apparently moribund.

PER CO. **ARIZONA.**
e of Fred Enos, secretary, Bridgeport, Conn. Mine office: Co., Ariz. Henry Setzer, president; Chas. D. Hawley, vice- eric S. Hunt, treasurer; Chas. E. Stevens, superintendent. , area 780 acres, circa 2 miles from Metcalf. Country rock is l by Cambrian quartzite and Silurian limestone, with much trusive porphyritic dykes, ores occurring near the fault-lines. rly 1906, running 12 to 30% copper, to the Shannon smelter. ered promising. Presumably idle.

K COPPER MINING CO. **IDAHO.**
nerly at Mullan, Shoshone Co., Idaho.

SH & SULTAN MINING CO. **WASHINGTON.**
Bailey Bldg., Seattle, Wash. Letter returned unclaimed from ce, Silverton, Snohomish Co., Wash. Richard Sykes, president; e-president and general manager; Willis B. Herr, secretary. 22, 1892, under laws of Washington, with capitalization es $50 par. Lands, 15 claims, area 275 acres, in the Stilla- , with 1,400′ of mine openings, showing low grade auriferous since 1905 and apparently moribund.

PPER MINING CO. **WYOMING.**
nerly at Encampment, Carbon Co., Wyo.

G CO. **ONTARIO.**
Desbarats, Algoma, Ont. James Stobie, president; A. B. ident and general manager; John Lear, secretary and treas- 1900, under laws of Ontario, with capitalization $1,000,000, Lands, 134 acres, in Block O, Johnson township, Algoma, On- vein of 3′ to 5′ width, carrying chalcocite, bornite and chal- load of ore, shipped 1901, gave smelter returns of 18% copper. 1901 and apparently moribund.

)PPER, LTD. **TRANSVAAL.**
rned unclaimed from former office, Silesia Bldg., Main St., Jo- nsvaal. Mine office: Turffontein, Pretoria, Transvaal. H. J. ordon and H. A. Stockman, directors. Organized circa Novem- laws of Transvaal, with capitalization £3,000. Property is a on Farm Rietfontein No. 282. Idle and apparently moribund.

PPER MINING CO. **CALIFORNIA.**
nerly at Burney, Shasta Co., Cal.

)PPER MINING CO. **COLORADO.**
Bank of Commerce Bldg., Minneapolis, Minn. Mine office: Co., Colo. C. T. Bergh, president; J. W. Allan, secretary; A. E. r. Has a 225′ tunnel, giving a fair showing of carbonate ore, native copper. Idle.

)PPER MINING CO. **MONTANA.**
nerly at Radersburg, Broadwater Co., Mont. Described Vol. II.

)PPER CO. **ARIZONA.**
s succeeded, January, 1906, by Stoddard Mines Co. Formerly vapai Co., Ariz. Fully decribed Vol. VI.

INES CO. **ARIZONA.**
Fifth Ave., New York, N. Y. Mine office: Stoddard, Yavapai loys 15 men. W. H. Reynolds, president; Hon. Isaac T. Stod- dent; C. M. Stoddard, secretary and treasurer; J. S. Murphy, r. Organized January, 1906, under laws of Arizona, as suc- lard Copper Co., with capitalization $100,000, shares $1 par; nnual meeting, in January.
aims, patented, area 105 acres, known as the Bing

some distance from a railroad, showing fissure veins in schist, opened by a 500' tunnel and shafts of 600' and 190', with circa 4,000' of workings. Mine was discovered 1882, and reopened, June, 1906, by present company.

Equipment includes a 50-h. p. steam plant, with 2 hoists and a 2-drill air compressor, and there are 6 mine buildings. Company reports that good ore bodies are being developed on the 600' level. Property considered promising.

KUPFERERZBERGWERK STOLZENBURG. LUXEMBURG.

Mine office: Stolzenburg bei Dickirch, Luxemburg.

STONE CREEK COPPER MINING & MILLING CO. MONTANA.

Dead. Formerly at Dillon, Beaverhead Co., Mont. Described Vol. V.

STONEWALL COPPER CO. ARIZONA.

Dead. Was a swindle, perpetrated by the notorious Wm. F. Wernse gang of St. Louis. Formerly at Pima, Graham Co., Ariz.

STORA KOPPARBERG BERSLAGS AKTIEBOLAG. SWEDEN.

Office, mines and works: Falun, Kopparberg's län, Sweden. E. J. Ljungberg, director; Lars Yngström, assistant director and general manager; Th. witt, mining engineer; K. A. Akerblom, superintendent leaching plant. Capitalization 9,600,000 kroner, shares 1,000 kroner par. Net earnings, 1907, were 2,377,987 kroner.

Lands, 5 claims, 3 patented and 2 unpatented, area 43 hectares. Mine was worked as early as A. D. 1288, and presumably earlier, oldest privileges of the present company dating from Feb. 24, 1347.

Lands include several mines and many ore bodies, largest being the Storgrufa, 370 meters long by 220 meters wide, and about 320 meters deep, mostly mined out, leaving an open pit circa 220' deep. Ore is chalcopyrite, containing selenium and bismuth, giving average returns of 2.7 to 3% copper, 10 to 15 grams silver and 2.5 to 3 grams gold per ton. Has 14 shafts, with aggregate depth of 1,800 meters, deepest being 343 meters, with about 33 kilometers of tunnels. The copper mine employs about 100 men, and gives a yearly production of about 45,000 tons of ore, which, after hand-cobbing, yields about 15,000 tons of leaching ore.

The roast stalls are one-half kilometer from the mine, and the leaching plant is one-half kilometer beyond the furnaces, all connected by tram-line. The roasted ore is crushed with salt, reroasted and leached with dilute sulphuric acid, in tanks, metallic contents of the leach-water being precipitated on scrap-iron, as cement copper, which is dissolved in sulphuric acid and turned out as bluestone. Yearly production averages circa 300 kgs. silver, 80 kgs. gold and 1,250 metric tons bluestone, equivalent to 300 tons fine copper. Company conducts extensive industrial operations, owning and operating iron and steel plants, a pulp-mill, paper-mill, sawmill, etc., and is developing an extensive water-power on the Dala river. Is one of the best managed and most successful industrial enterprises of Sweden.

STORRGRUFA MINE. SWEDEN.

Owned by Stora Kopparberg Berslags Aktiebolag.

STRATTON GOLD & COPPER MINING & MILLING CO. COLORADO.

Office: Salida, Colo. Mine office: Turret, Chaffee Co., Colo. R. F. Stratton, president; F. S. Green, vice-president; Dr. J. F. Roe, secretary; Ove Sullivan, treasurer. Organized 1905, under laws of Colorado, with capitalization $500,000, shares $1 par. Lands, 16 claims, in 2 groups, the Stratton group of 11 claims, area 220 acres, being in the Badger Creek district of Fremont county, and the Copperopolis group of 5 claims being near Turret. The Stratton group has a 1,400' crosscut tunnel, with back of 900', showing ore assaying up to 46% copper. The Copperopolis group is said to have a 600' shaft, showing an 8' vein giving ore assaying well in copper. Company said to plan a leaching plant.

ICKLEY-MONTEZUMA MINING CO. **UTAH.**

Mine office: Bingham Canyon, Salt Lake Co., Utah. W. J. Strickley, intendent, at last accounts. Has auriferous copper ores, and steam power. several years and apparently moribund.

)NG COPPER CLAIMS CO. **OREGON.**

)ead. Lands sold, circa 1901, to Waldo Smelting & Mining Co. Formerly aldo, Josephine Co., Ore.

)NG COPPER MINING CO. **WYOMING.**

ffice: 210 Grant Ave., Laramie, Wyo. Mine office: Leslie, Albany Co., Employs 15 men. N. E. Corthell, president; M. E. Stickney, vice-presi- Dr. I. R. Swigart, secretary, treasurer and general manager; E. P. Baker, superintendent. Organized Jan. 17, 1903, under laws of Wyoming, with lization $1,000,000, shares $1 par; issued, $837,959. Annual meeting, Wednesday in January. Lands, 16 claims, unpatented, area 260 acres, 14 miles northeast of Laramie, reported to show a fissure vein in peg- , which perhaps is a pegmatite dike, and contact deposits between lime- and granite, latter, of 7′ estimated average width, carrying malachite, eite, bornite, chalcopyrite, galena and wuulfenite, giving average assays copper, 5 oz. silver and $3.60 gold per ton, with some lead and molybdenum. has about 20 shallow pits, a 335′ shaft and a 450′ tunnel, with circa 1,300′ rkings, estimated by management to show 10,000 tons of ore, mainly chal- te, with considerable chalcocite on the 250′ level, the vein carrying 2′ to concentrating ore, with occasional paystreaks of ore of smelting grade. quipment, burned July, 1907, has been replaced by an 80-h. p. steam including a 25-h. p. hoist and a 3-drill Norwalk air-compressor. There mine buildings, and company plans a concentrator.

D A. STUART. **PERÚ.**

ffice and mine: Quicacheca, Yauyos, Lima, Perú. Property, near the in the first mountain range back of Lima, carries argentiferous copper ad ores, also coal.

NI COPPERS (NATAL), LTD. **NATAL.**

ffice· Pietermaritzburg, Natal. Mine office: Vryheid, Zululand, Natal. Calderwood, M. I. M. M., consulting engineer. Organized July, 1908, laws of Transvaal, with capitalization £45,000, shares £1 par. Of the l stock, £15,000 was issued for working capital, and £24,000 was issued to endors, leaving £6,000 unissued.

ands, circa 2,000 acres, freehold, on the Subeni river, about 42 miles of Vryheid.

roperty shows granite, with bodies of schist carrying 2 copper veins, of 8′ width, containing bornite and chalcopyrite, developed to depth of circa by shafts and tunnels. Ore was discovered 1879, but operations were aded during the Boer war, and the native rebellion. Active work was August, 1908, but a shipment, 1907, of 150 tons of hand-picked ore, is o have returned an average of 20% copper. Formation is said to be hat disturbed and ore pockety, but property is considered not devoid of se.

ESS COPPER MINING CO. **ARIZONA.**

ead. Formerly at Quartzite, Yuma Co., Ariz. Fully described Vol. VII.

ESS MINING CO. **MONTANA.**

ine office: Saltese, Missoula Co., Mont. Leslie Bailor, vice-president sistant manager; H. F. Samuels, president and general manager; O. H. nine superintendent. Property is the Monitor mine, held under bond and with 700,000 shares of the 1,000,000 shares capitalization of the Monitor ow, at a price understood to be about $150,000. Bond and lease expire 1910, and by the terms of the agreement, the Success company must

expend $60,000 on development work, sinking shaft 300′ additional and mal 1,600′ of lateral openings. Net smelter returns are to be held by trustee be returned to operators, up to $60,000.

SUCCESS MINING CO. WASHINGT

Dead. Formerly at Conconully, Okanogan Co., Wash.

SUDBURY MINING CO. BRITISH COLUMB

Office: Spokane, Wash. Mine office: Deadwood, Boundary district, B Jas. Schiewe, president; preceding officer, J. D. Whitels, A. S. Eldet, W. Reeder and W. O. Lewis, directors. Organized April, 1907, under laws Washington, with capitalization $250,000. Lands, one-half mile from the Sun mine of the Dominion Copper Co., have 2 shafts, one, of 60′, being said to hav good showing of low grade copper ore. Has electric power. Property con ered promising.

SUERTE MINING CO., S. A. MEXI

Mine office: La Cananea, Arizpe, Sonora, Mex. Harry Lane, preside John F. Evans, vice-president; W. R. Peters, secretary; Louis Lease, treasu and general manager. Organized 1908, under laws of Mexico. Lands, 60 h tares, in the Sierra Santa Cruz, west of La Cananea. Began development o September, 1908, by shaft.

SUGAR LOAF MINING CO. SOUTH DAKO

Dead. Formerly at Custer, Custer Co., S. D. Described Vol. VII.

SULITELMA AKTIEBOLAG. NORWA

Office and works: Helsingborg, Malmöhus Län, Sweden. Mine off Sulitjelma, Nordland, Tromsö, Norway. Employs circa 2,000 men. Lord-Lieut. Tornerhjelm, president; Consul Nils Persson, vice-president and general m ager; Sture Person Henning, assistant general manager; Vice-Consul C. Ing son, secretary; preceding officers, Aug. Sylvan, Thure Röing, R. M. B. Sch berg, C. E. Hedström, Hon. Albert Berg von Linde, Prof. Hjalmar Sjögren a Ivar Person Henning, directors; Holm Holmsen, general manager; Fr. Carls mine superintendent; P. Kjölseth, mill superintendent; J. Westlake, smel superintendent; L. D. Jenssen, engineer.

Organized 1890, under laws of Sweden, with capitalization 3,000,0 kroner, increased, 1906, to 6,000,000 kroner, and again increased, 1908, 8,000,000 kroner, shares 500 kroner par. Paid an 8% dividend, 1905, amounti to 240,000 kroner, and paid total dividends, to end of 1905, of 1,800,000 krone Annual meeting, in May.

Lands, 253 claims, area 55 acres, also a 1¼-acre millsite, and 193 squa miles miscellaneous lands, more or less extensively mineralized, in the Fros district of Nordland, mainly in the Skjerstad division of Nordland, Troms Lands include the Sulitjelma, Carlotta, Geken and Altens groups of mine The Sulitjelma, discovered 1875 and opened 1887, which has become the pri cipal copper mine of Norway, shows mica-schist of lower Silurian age, wit eruptive flows of greenstone conformable with the schists. Ore bodies occu as extended lenses, very persistent in strike and depth, on the contact o schists with metamorphosed amphibolite and olivine gabbro, lenses having generally east and west strike, with dip of 10° to 45° with the horizon. There are 18 known ore bodies, of which 15, under development, range 15′ to 20′ i width, traceable 450′ to 2,200′, deepest proven to depth of 2,300′, carrying exclusively cupriferous iron pyrites, averaging 3% copper, 45% sulphur and 0.5 oz. silver per metric ton.

Development is mainly by tunnel, there being one shaft of 280′ depth and 9 tunnels, the names and number of feet of workings of the latter, at end of 1905, being as follows: Ny-Sulitelma, 8,940′; Hanka Bakken, 1,040′; Gåse 15,800′; Carlotta, 11,100′; Måns-Petter, 2,450′; Bursi, 700′; Koch, 2,740′; Torne hjelm, 3,000′; No. Nine, 2,160′. The mine has total openings of about 1

s, showing 2,502,000 metric tons of ore, with 953,000 tons blocked out for ing, in 1906. Electric underground haulage is used exclusively, with 2 meters of track in the mines.

Ores, as mined, are divided into two classes, the first or smelting grade ying 4 to 8% copper, while the second or export grade carries 1.5 to 4% er and an average of 45% sulphur, the average tenor of all ores mined g about 3% in copper and 45% in sulphur. Of the sulphur ore exported, t half is fines and half lumps, sent to Helsingborg, Riga, Antwerp, Ghent various ports in Great Britain.

Equipment includes a 970-h. p. water power plant, 1,220-h. p. electric t, 780-h. p. air plant and 10-h. p. gasoline plant, with 400 h. p. developed at nine, 390 h. p. at the mill and 560 h. p. at the smelter. Equipment includes oists and one Ingersoll-Sergeant, one Burchard and 3 Schramm air-com- ors, with an aggregate capacity of 28 drills. There are 25 air-drills and Temple electric air-drill.

Mine buildings are of wood, the machine-shop having an area of 1,290 re feet, carpenter-shop 1,291 square feet, and smithy 1,722 square feet. e are 2 sawmills, a general store, school, church and Good Templars' lodge, a large number of dwellings, the company owning a total of 320 buildings. There is an extensive system of aërial tramways, with 15 stations and 2 r stations, the tram system including a 4-mile line to the Jakobesbakken , which is to be operated more extensively in the future.

The concentrator, of wood, area 37,950 sq. ft., is equipped with 8 Blake hers, a 15' Krupp Grusonwerk centrifugal crusher, 9 rolls, 91 Hartz jigs, ührig and Ferrari concentrators and 24 vanners. There also is a 1,000-ton ore vacuum oil concentration plant, with 12 units, in a separate mill of 00 sq. ft. area.

The smelter, at Fagerlid, 2 to 5 miles from the various mines, receiving therefrom by aërial trams, has a daily capacity of 160 tons. Equipment ades a 50-ton water-jacket blast-furnace, one reverberatory furnace, two on pyritic smelting converters of the Knudsen type, and one converter d, with 10 shells of the Manhes type, taking 7.5 metric ton charges. First- on product is a matte of 30 to 40% copper tenor, and final product is ter copper assaying 99.2% in tenor, sent, for refining, to the Helsingborg parverks Aktiebolog, at Helsingborg, Sweden, where there is a leaching t, in connection with the works. Ores smelted average 6 to 8% copper, o 34% sulphur, 34 to 36% iron and 2 to 4.5% alumina, with traces of lime magnesia. The smelter uses for conversion the Knudsen discontinuous tic process, which largely utilizes the calorific value of the sulphur, and ils small coal consumption, giving very satisfactory results. By reason nprovements made, 1907, the loss of copper in smelting amounts to about only, slags being said to run only 0.2 to 0.3% copper, as against a loss of t 15% formerly, and conversion costs are said to be under $1 per ic ton.

Miscellaneous enterprises of the Sulitelma include 7 steamers, 2 tugs, 40 es and a 13-kilometer private railway system, known as the Sulitjelma- n, of 750 mm. gauge, equipped with 3 locomotives and 120 freight cars.

Fuel consumption and costs were as follows, in 1907: 3,600 cords of wood e mine and 260 cords at the smelter, costing 10.5 kr. per cord; 1,500 metric coke at the smelter, costing 31 kr. per ton; 690 tons coke and 6,620 tons coal, costing 18 kr. per ton; 7,400 gallons petroleum.

Production has been as follows: 605 metric tons fine copper and 90,000 cupriferous pyrites, exported to sulphur burners, carrying 2,442 metric fine copper, in 1904; 447 tons fine copper from 10,479 tons ore smelted and er exported in pyrites giving a total output of 6,225,856 lbs. fine copper

in 1905; 589 metric tons fine copper and circa 2,800 tons copper contained in pyrites exported, in 1906; 1,384,486 lbs. fine copper, secured from circa 1,900 tons of ore smelted, and 102,000 metric tons cupriferous pyrites exported, averaging 3% copper, giving gross production of 8,140,562 lbs. fine copper, in 1907. During 1907 the Knafjord mines, in Alten, produced 4,150 tons cupriferous pyrites, yielding circa 1,050 tons of concentrates, shipped to the Sulitelma for smelting. The management is progressive, and the Sulitelma has by no means reached the limits of its productive capacity, though already much the largest copper producer of Norway, and one of the leading copper mines of Europe, while giving every prospect of increased production for the future.

SULTANA-ARIZONA COPPER CO. ARIZONA.

Office: 1356 First National Bank Bldg., Chicago, Ills. Mine office: Kelvin, Pinal Co., Ariz. John B. Mecham, president and general manager; Dr. H. W. Pierson, vice-president; C. H. Seamans, secretary and treasurer; preceding officers, W. Esty Curtis, L. G. Bronson, J. W. Nye and John D. Riley, directors; Jerry T. Harrington, resident manager and superintendent; H. C. Erman, consulting engineer. Organized June 5, 1906, under laws of Arizona, with capitalization $2,500,000, shares $1 par, apparently as a reconstruction of the National Mining & Development Co. Annual meeting, first Tuesday after first Monday in June.

Lands, 19 claims, 1 patented, area 380 acres, also three 15-acre millsites. Company also reports holdings of 30 acres of gold and silver lands, in the Ures district of Sonora, Mexico.

The Arizona lands, said to have been bought for $120,000, are in the Riverside district, across the Gila river from Kelvin, including the Riverside and Bryan groups. Property is said to show 7 different veins, which management says probably will unite at depth, of which 5 veins have been more or less developed. Property also is said by company to have 12 copper veins and 4 silver veins. The 5 veins under development are said to be 18" to 6' wide, and are estimated to average 4' 6" width, with a generally NW. and SE. trend, showing the usual oxidized ores above, with sulphide ore, mainly chalcopyrite, in the lower workings. Property is said to show a 4' vein, averaging 15% copper, in the upper levels, and a 6' vein, in the lower levels, carrying chalcopyrite, from which shipments to the Humboldt smelter have returned 8.7 to 10.6% copper. Average tenor of ore of all veins is estimated by company at 10% copper and 4 oz. silver per ton, which is too high.

Development is by 5 shafts, of 40' to 300' depth, and by 7 tunnels, of 30' to 264' length, with various open-cuts, giving a total of circa 3,500' of workings, of which about 1,000' were made during latter half of 1907. Company estimates 40,000 tons of ore in sight, with 30,000 tons blocked out for stoping, and there are several thousand tons of low grade ore, of fair copper tenor, on the dumps.

Equipment includes a steam plant with one hoist, and it is planned running a 1-mile aërial tram across the Gila river, to the railway station at Kelvin. Company plans a concentrator, of 200 to 300 tons daily capacity.

Company was said, October, 1907, to have settled its indebtedness, preparatory to resumption, and, early 1908, was making small but regular shipments of ore, of 12 to 20% copper tenor, to El Paso smelter. Some ore was shipped before property was owned by present company.

SULLIVAN-ARIZONA COPPER CO. ARIZONA.

Letter returned from former office, Joliet, Ills. Mine office: Kelvin, Pinal Co., Ariz. John B. Mecham, president; Chas. W. Seaman, secretary and treasurer. Organized circa March, 1907, with capitalization $2,000,000, shares $1 par. Possibly succeeded by Sultana-Arizona Copper Co.

SULLIVAN COPPER DEVELOPMENT CO. ARIZONA.

Office: Duluth, Minn. Mine office: Paradise, Cochise Co., Ariz. Geo

rosby, manager. Lands are claims adjoining the holdings of the Manhattan velopment Co., in the Chiricahua Mountains. Idle.

LLIVAN GOLD & COPPER MINING CO. **MONTANA.**

Mine office: Kalispell, Flathead Co., Mont. Idle some years.

LPHIDE COPPER CO. **COLORADO.**

Office: P. O. Box 358, Denver, Colo. Mine office: Crested Butte, Gunni- Co., Colo. J. C. Lewis, president; Frank Jerome, vice-president; Geo. S. n, secretary; Geo. N. Wheeler, treasurer; Horace Miller, manager. Lands, he Rock Creek district, have 75′ and 170′ tunnels, in argentiferous copper Idle some years.

PHIDE MOUNTAIN MINING & MILLING CO. **WASHINGTON.**

Office: care of Hon. E. C. Trimble, Seattle, Wash. Mine office: Orient, y Co., Wash. Lands include the Pomeroy mine, on Sulphide Mountain, iles northeast of Orient, in the Colville reserve, opened by sundry open-cuts a 200′ shaft, showing ore giving good assay values in copper, lead, silver gold. Idle.

IAS MINING CO. **WASHINGTON.**

Mine office: Sumas, Whatcom Co., Wash. W. W. Jones, president; Mrs. Record, secretary. Lands, near the head of Swamp Creek, show auriferous er ores. Idle several years.

MITOMO COPPER CO. **JAPAN.**

Office: Kitahama, Higashiku, Osaka, Japan. Mine office: Niihama, Iyo, oku, Japan. Works office: Shisakajima-Oshigun, Iyo, Shikoku, Japan. Suzuki, director-in-chief; T. Shidachi and Kinkichi Nakata, directors; R. io, chief auditor; K. Yukawa, manager; Munio Kubo, vice-manager; sumoto, sub-manager; S. Maki, sub-manager and mine superintendent; T. io, superintendent; Keijiro Nakamura, smelter superintendent.

Lands, 3 claims, area 6,353 acres, also a 5-acre millsite, 33,452 acres timber ls and 575 acres miscellaneous lands, in the Besshi district. Area of the shi mine proper, on Besshi Mountain, 4,400′ in height, is 209 acres. The ber lands carry large plantations of fir, set out yearly, since 1879, which e become available for mine timber, 15 to 20 years' growth being required. ter supply is taken from the Tokuriu river.

The Besshi mine shows graphitic, chloritic and sericite schists, carrying edded deposit of 4′ to 10′ thickness, with an average of 7′, having a strike N. 30° E. and average dip of 45° NE., traceable 9,000′ and proven to th of 3,000′, with workings exceeding 6,000′ in length. The bedded vein urs in alternate layers of chloritic and graphitic schist, each enveloped in uartz-schist known as "habu," with interstratification of piedmontite schist, faults, running east and west, and nearly parallel, giving frequent throws 10′ to 20′, with a maximum throw of 50′. The ore is an intimate mixture chalcopyrite and pyrite, sometimes occurring as partial segregations in te, banded with schist, averaging, as mined, circa 4% copper, brought up, dressing, to an average copper tenor of about 5.5%.

The Besshi mine, near Kyoto, in the northwestern part of the island of oku, has been in the ownership of the Sumitomo family since its opening, . 1690, and was making more than 3,000,000 lbs. fine copper yearly at the of the Seventeenth Century, being, at that time, perhaps the largest er producer of the world. The mine is opened by the Toyen shaft of ′ depth, sunk at an incline of 49°, with 9 levels opened, largest produc- being from the 6th and 7th levels, the shaft connecting on the 8th level, epth of 1,300′, with the new Tonaru crosscut tunnel, of 6,123′ length. e are other crosscut tunnels, of 430′ and 4,172′ length. The mine has a m of natural ventilation, by which hot air from the valley, entering gh the Tonaru tunnel, escapes through the mouth of the Toyen incline

shaft, near the top of the mountain, the air current being regulated by [illegible] tices. The mine is well timbered, with a tram-line on each level, and ore is extracted by overhand stoping, guncotton being used mainly for blasting, with a little dynamite and occasional gunpowder. The mine has electric pumps, forking water from the lower workings into a large sump on the 8th level, whence it is discharged through the Tonaru tunnel, which is lighted throughout by electricity, and has the terminal station of an aërial tram at its portal. The mine has circa 50,000′ of workings, with about 2,500,000 tons of ore blocked out for stoping. The company plans driving a fourth tunnel, of about 2 miles length, and sinking a 1,900′ vertical shaft to connect therewith.

Mining equipment includes a 740-h. p. installation having three 200-h. p. hoists, good for 1,200′ depth each, 3 Rand air-compressors and 2 Leyner and 3 Schramm air-compressors, with 6 Schramm air-drills and 5 Leyner air-drills. Owing to the method of ore extraction through the tunnel, no exceptionally powerful machinery is required.

As the mine, tunnel, mill and works lie on successive levels, the fullest possible advantage is taken of gravity in all operations, resulting in a great saving of power.

The crushing plant, of wood, built 1906, at the mouth of the Tonaru tunnel, is of 800 tons daily capacity, equipment including one 50-h. p. and two 40-h. p. Blake jaw crushers. Ore assortment is by hand-labor, there being no machinery, otherwise than the crushers.

Owing to complaints by farmers of damage from copper-laden waters, a cementation plant has been installed, and considerable copper is precipitated on scrap iron, the production of regulus amounting to upwards of 200 tons yearly.

Leading from the portal of the Tonaru tunnel is a 3,600-meter Bleichert aërial tram, to Hateba, with longest span of 600 meters, having an hourly capacity of 90 tons, at an average speed of 2.5′ per second. At Hateba is the terminus of a railway running to Niihama, the nearest port. The connections between the mine and shipping wharf include the 6,123′ Tonaru tunnel, circa 2 miles of aërial tram and 5½ miles of railway, a total of about 8 miles. The mine has 3 aërial trams, of 2,276′, 5,200′ and 5,178′ lengths, respectively.

The company owns 2 private railroads, of 9.73 miles total length, of 3′ gauge, equipped with 10 locomotives, 10 box-cars and 184 ore-cars.

A hydro-electric power installation, on the Tokuriu river, transmits electric energy to the central plant, at Niihama, whence power is distributed to the mine, mill, shops and smelter. The company plans a new hydro-electric installation, to utilize a flow of 30 cubic feet per second, deliverable under a 2,000′ head.

The general shops, at Niihama, about midway between the mine and smelter, include a foundry making castings up to 5 tons in weight, extensive carpenter-shops, machine-shops, boiler-shops and smithies, these works not only making ordinary repairs, but turning out a considerable part of the machinery and castings used at the mines, works and smelter.

The Besshi smelter formerly was at Niihama, but, owing to serious damage to neighboring farmers from smelter fumes, the entire reduction plant was transferred, 1906, to the Island of Shisakajima, 12 miles from Niihama, only the general shops remaining at the old smelter site.

The new Shisakajima reduction plant, built at a cost of about 4,000,000 yen, is one of the most modern in existence, both in design and equipment. Ore is received by vessel at a wharf, where unloaded by a 20-ton crane into cars that are hauled up an incline to the top of the smelting works, and

ed in counterbalance. The works are laid out in 7 terraces, gravity utilized throughout.

he smelter has 786 open stalls, for roasting ore and matte, about one- of the capacity being required for matte, each of the stalls being of is capacity, roasting of raw ore requiring an average of 30 days. The ing stalls are connected with a central high chimney. The smelter r has four 160-ton rectangular water-jacket blast-furnaces, and two 17- verberatory furnaces for refining, one being used as a spare. There also sets of Atebuki furnaces using an old Japanese process, improved by umitomo company, for the conversion of matte, these having a daily ity of 32 tons of roasted matte each, one being used as a spare. Product ster copper averaging 99.8% in tenor, carrying only about 0.015% silver .0003% gold per ton. About 20% of the product is sent to the Osaka g mill, owned by the Sumitomo family, and a greater part of the re- ler forwarded to Kobe, where it is exported, mainly to Europe. The er has three No. 4 and three No. 6 Connersville blowers, for furnace and an air-compressor for the converter department. Barren quartz es are used for fluxing, no silicious ores being available for the purpose. uel used at the mine is coal, and fuel at the smelter is coal, coke and gases from coke-ovens. The company has a coking plant, at Niihama, 72 brick kilns, with a daily capacity of 55 tons, using coal from the i mine, at Kiushiu. Cost of coal is $2.70 to $3.50 per short ton, according ade, and $4.70 per short ton for coke. Requirements are about 4,725 tons y of bituminous coal of best grade and 27,340 tons of ordinary bitu- us coal, in addition to coke for the smelter.

The company owns a very extensive fleet of vessels, including 2 steamers passengers and package freight, 2 tugs, 1 steamer for carriage of coal, 81 sailing vessels, with 20 sailing vessels held under charter. The com- operates a passenger line, with 2 steamers, plying between Niihama Kobe, a distance of 125 miles.

The company's miscellaneous enterprises are very extensive, including a number of warehouses and stores, and there is a branch of the Sumitomo at Niihama. There is a main hospital with 4 branches, and the company tains five elementary schools for children of its workmen.

The Sumitomo company employs about 6,000 people, of whom about 10% are women.

Production was 11,973,833 lbs. fine copper in 1906; 11,674,582 lbs. in and circa 12,000,000 lbs. in 1908. No copper mine in the world, of its has a better smelting equipment than the Besshi, and the management ghly progressive and efficient in all departments.

SET COPPER CO. **ARIZONA.**

Letter returned unclaimed from former mine office, Mayer, Yavapai Co., Apparently is controlled through stock ownership by, or has been sold ght to, Consolidated Copper Creek Mining Co. Lands, in the Copper district, circa 20 miles east of Mayer, are said to show a vein of 75' , traceable for several miles, which may be an exaggeration. Has a wo-compartment shaft, planned to be sunk 500', with 135-h. p. boiler, and 8-drill air-compressor.

SET COPPER CO., LTD. **BRITISH COLUMBIA.**

Head. Formerly at Princeton, Boundary district, B. C.

MIT COPPER MINING CO.

Office: care of Daniel Sinclair, Yakima, Wash. Organized, early 1907, laws of Washington, with capitalization $1,000,000.

MIT GOLD & COPPER MINING CO. **WASHINGTON.**

Letter returned unclaimed from former mine office, Laurier, Ferry Co.,

Wash. Lands show a wide vein of low grade ore, carrying a 4" paystreak giving good assay values in gold and copper. Idle.

SUMMIT MINING & MILLING CO. WASHINGTON.

Office: Davenport, Wash. Mine office: Keller, Ferry Co., Wash. C. H. Neal, president; C. A. Gray, secretary. Has a 100' shaft, showing argentiferous and slightly auriferous copper ore, giving assays of about $60 per ton. Idle several years and apparently moribund.

SUMPTER SMELTER. OREGON.

Owned by Oregon Smelting & Refining Co.

SUN-ANCHOR COPPER MINING CO. WYOMING.

Mine office: Encampment, Carbon Co., Wyo. L. W. Tennant, president; Geo. Kuntzmann, secretary and treasurer. Capitalization $1,000,000. Lands, 3 claims, area 60 acres, on Green Mountain, near the Moon-Anchor. Idle several years and presumably moribund.

SUNDOWN MINE. AUSTRALIA.

Mine office: Stanthorpe, Southern Queensland, Australia. Lands are on Ballandean Run, circa 20 miles from Stanthorpe. Property includes a tin mine on the western side of Little Sundown Creek, on which work is in progress, also a copper mine that has been idle for several years.

SUNIK MINES. RUSSIA.

Mine office: Evlach, Transcaucasia, Russia. Property is in the Zangezur district, on the Tiflis & Baku railroad, 30 miles from Evlach and near the Persian line. Ore is mainly chalcopyrite, with occasional bornite, both slightly auriferous and argentiferous, and a little native copper. Property shows a system of 20 known veins, of 7" to 4' width, cutting andesite and diabase, with fault fissures, carrying ore of about 7% average copper tenor, as mined. Development is mainly by tunnel and the workings are of a primitive nature, deepest being about 130'.

SOCIEDAD COLECTIVA C. y J. SUNDHEIM. SPAIN.

Office: Huelva, Spain. Mine office: Puebla de Guzmán, Huelva, Spain. Is an incorporated co-partnership between Don Carlos Sundheim de la Cueva and Doña Justa Sundheim de la Cueva. Wm. Guthrie Bowie, manager; Jorge Riecken, mine superintendent. Property includes the Cabezas del Pasto, Sierracilla del Tamujoso and Malagon mines.

The Cabezas del Pasto includes 6 mining concessions, area 104 hectares, with about 300 hectares of adjoining lands, having 12 shafts, deepest 104 meters, with circa 6,000 meters of workings. Ore developed for immediate extraction is estimated at 750,000 tons of pyritic ore and 1,500,000 tons of cupriferous schists. Lenses apparently increase in size with depth. Ore is extracted by overhand stoping, and dry-walling is used in depleted stopes. Ores carry 1.5 to 5% copper, 40 to 52% sulphur and 40 to 44% iron, and the schists range 0.25 to 30% in copper tenor. All pyritic ore above 1.5% copper, and all schists above 10% copper, are exported. The lower grade ores are lixiviated at the mine, and the washed sulphur ore is exported to France. The mine water carries up to 9 kgms. copper in solution per cubic metre, mostly saved by cementation. The cement copper is washed and classified, best quality averaging 98.5% copper, which is the best grade of cement copper produced anywhere. Mining by overhand-stoping and rock filling is said to prove safer and cheaper than open-cast operations. Surface plant includes Robey hoisting and pumping engines, and the mine has a tramline of 75 cm. gauge, also an aërial tram to the wharves at La Laja, on the River Guadiana.

The Sierracilla del Tamujoso was a small producer under former operators, but ore is complex, requiring special treatment, and the property has been idle for some years.

Malagon is a group of government concessions, showing good out-
th many old workings, but is idle also.

HT MINING CO. **ARIZONA.**

l. Was merged in Great Belcher of Arizona Co. Formerly at Provi-
avapai Co., Ariz.

HT MINING & MILLING CO. **COLORADO.**

l. Formerly at Eureka, San Juan Co., Colo.

IOON MINING & MILLING CO. **COLORADO.**

e office: Idaho Springs, Clear Creek Co., Colo. R. C. Bonney, general
Lands carry auriferous and argentiferous copper and lead ores.
m and electric power and a 50-ton cyanide plant, employing circa

CORNER SILVER MINING CO. **AUSTRALIA.**

e office: Sunny Corner, N. S. W., Australia. Is primarily a silver
s carrying an average of 1% copper, copper being used as a carrier for
an argentiferous copper matte. Copper production, when working,
a 75,000 lbs. yearly. Idle several years.

IDE COPPER MINING CO. **WYOMING.**

l. Formerly at Riverside, Carbon Co., Wyo.

E COPPER CO. **WYOMING.**

e office: Sunrise, Laramie Co., Wyo. O. L. Vincent, president; H. P.
secretary. Organized, September, 1902, under laws of Wyoming.
bout 11 miles from Sunrise, were worked originally for iron ore. The
es carry gold and silver values. Mine produced, 1881-1893, ore valued
82. Idle.

COPPER MINING CO. **WASHINGTON.**

e: Glens Falls, N. Y. Operating office: Everett, Wash. Letter re-
nclaimed from former mine office, Index, Snohomish Co., Wash., Sep-
1908, at a time when the company claimed to be working 6 men.
cNutt, president and general manager; A. G. Selinghana, secretary
surer; W. W. Black, also reported by company as general manager;
officers and E. M. Melzger, trustees; B. J. Gallitspa, superintendent;
E. Ritter, engineer. Organized 1897, under laws of Washington, with
ation $3,000,000, shares $1 par, said to have been increased, circa
$4,000,000, but company reports, 1908, a capitalization of $3,000,000
mpany reported, Sept. 3, 1908, liabilities of $55,000, with $5 cash on
nnual meeting, second Tuesday in January.

ls, 36 claims, 18 patented, reported as of 780 acres area, which is im-
as the area of 36 claims would be only a trifle more than 720 acres.
clude the Sunset group of 23 claims, well timbered, on the eastern
the north fork of the Skykomish river, about 5 miles from Index,
the Ethel group. The Mountain Side group of 7 claims has circa
unnels.

Sunset mine shows granite, carrying parallel fissures, varying, on
from mere seams to several feet in width, said to be traceable up to
e smaller veins being short-lived, and disappearing entirely at shal-
h. The main vein of the Sunset, of 3′ to 17′ width, is claimed to be
here widest, carrying mainly auriferous chalcopyrite, at and near
and being reported to carry considerable argentiferous bornite at
hich seems reversing the usual order of things. Gangue is quartz,
ed at surface, but solid at depth. Company reports ore as averaging
per and 8 oz. silver per ton, with small gold values, but returns from
of selected ore, sent to the Tacoma smelter, were only 9% copper.
ent is by a 596′ tunnel, with circa 1,800′ of workings.

pment includes several small shops, bunk-houses and a small saw-

mill. A water power is said to have been developed. The mine i
have a 6½-mile tram, to Index. Work was begun on a concentrat
foot of the tram-line, but apparently the mill was not completed.
slimes badly in concentration.

The exceedingly devious methods of promotion followed by this
under various managements, none good, were fully described in Vol
and V. Apparently the present management should not be held re
for all the lies of its predecessors. Neither company nor property is
with especial favor.

SUNSET MINING & MILLING CO. AR

Office: 719 Majestic Bldg., Detroit, Mich. Letter returned unclaim
former mine office, Dos Cabezos, Cochise Co., Ariz. Frederick C. Deinze
dent; Eugene F. Bradt, vice-president; Frank A. Rasch, secretary
Carl Franke, treasurer; preceding officers, Geo. Greening, Edward J. G
Fredk. Knorr and Oscar R. Marx, directors; Geo. H. Wilson, superint
Organized 1904, with capitalization $1,000,000, shares $1 par. La
claims, area 200 acres, circa 10 miles from Willcox, having shafts of
100′, showing argentiferous copper ore. Company sued a Calumet bro
$20,000 damages for offering stock at 25 cents, when company was
$1 per share. Management is composed of men of good standing, th
president being a practical and capable mining man.

SUNSET NATIONAL MINING CO. MON

Mine office: Homestake, Jefferson Co., Mont. R. L. Stevens, m
Lands, 2 groups, one of 2 patented claims, area 35 acres, and one of 76
about 4 miles north of Homestake, developed by a 250′ tunnel, showi
assaying 5% copper, 4.4 oz. silver and $3.20 gold per ton.

SUPERIOR-ALTA MINING CO.

Office: care of Walter L. Maas, secretary and manager, Salt Lak
Utah. Letter returned unclaimed from former mine office, Alta, Salt
Co., Utah. A. J. Jacobson, president; L. A. Jeffs, vice-president. Cap
tion $300,000, shares $1 par. Idle several years.

SUPERIOR-BONANZA MINING CO. ME

Office: Calumet, Mich. Mine office: Imuris, Magdalena, Sonora,
A. S. Cox, chairman; R. E. Lopez, secretary; Wm. Gmahling, treasurer;
E. Penberthy, consulting engineer; Chas. Hanley, superintendent. Org
March, 1907, with shares $10 par, as successor of Sonora Bonanza Mini

Lands, 135 hectares of mineral lands, with extensive holdings of
laneous lands, circa 35 miles south of Nogales, showing a prominent
of 10′ average width, traceable 1½ miles, giving quite uniform assays
to $7 gold per ton, the underlying vein, of 6′ to 10′ average width, a
a 3′ paystreak carrying argentiferous galena, chalcopyrite and wulfenit
occasional free gold. Has 2 shafts, of circa 450′ depth each, 1 showing
tom a 12′ vein carrying 3 to 5 oz. silver and $5 to $10 gold per ton. T
Miguel property, having a broken formation, was idle at last accounts.

Equipment includes steam plant with 3 boilers, 2 hoists, 2 pump
compressor and an electric light plant. Water is secured from a we
stored in a reservoir. Improvements include a general store, dwellin
workmen, lime-kiln, small brick plant and a small concentrator. P
considered promising.

SUPERIOR & BOSTON COPPER CO. ARI

Office: Houghton, Mich. Mine office: Globe, Gila Co., Ariz. W
Rice, president; John H. Rice, vice-president; John R. Pimlott, secreta
treasurer; preceding officers, Hon. Norman W. Haire and George E
directors; Frank H. Probert, consulting engineer in charge; W. E.
superintendent.

ganized Nov. 23, 1906, under laws of Arizona, with capitalization
,000, increased, Sept. 5, 1908, to $2,000,000, shares $10 par. Had 1,585
olders of record, Sept. 15, 1908. Fiscal year ends Sept. 30. State Street
Co., Boston, registrar; Boston Safe Deposit & Trust Co., transfer agent.
s, late 1908, were being listed on the Boston Stock Exchange.
tatement for fiscal year ending Sept. 30, 1908, gave $225,392 received
assessments Nos. 2 and 3; $247,610 from sale of additional stock issued;
.02 from interest, and $48,341.61 received from sales of ore. Expendi-
for the year included $143,010.20 for development and general expenses.
00 for commission for underwriting the new stock issue, $17,017.19 for
ruction and equipment, and $3,368.10 for patents and miscellaneous ex-
s, with a $132,800 payment on lands, leaving a balance on hand of
$42.76, of which $278,690.11 was cash. Accounts payable were $11,195.56.
hase price of company's lands was $365,000, and final payment thereon,
$44.20, was made Oct. 15, 1908.
Lands, 45 claims, 19 patented, others in process of patenting, area circa
cres, including the Globe & Arizona holdings of 22 claims, bought for
000, and an adjoining group of 21 claims, bought for $46,000, giving a
uet tract, east of and adjoining the Arizona Commercial mine and prop-
of the Old Dominion. Lands are about 4,200′ above sea-level, and circa
above Pinal Creek at Globe, hence the mine should not be as wet, at
, as is the case with the Old Dominion. The property carries ample lime-
and iron ore for fluxes. The company also has an option on the Collins
e group of 6 claims, immediately north of and adjoining the Great East-
nine, which property carries the extension of the Old Dominion vein, and
nsidered promising.
The property shows Pinal schist, overlaid by circa 600′ of quartzite, which,
arn, is covered, conformably, by circa 500′ of Globe limestone, showing
sions of diabase, causing extensive mineralization. The property shows
dominant lines of faulting, the main series, which runs northeast and
hwest, including, from north to south, the Old Dominion, Great Western
Black Hawk, Limestone, Quo Vadis, Black Oxide and Iron King faults, or
s, these being intersected, at nearly right angles, by another series of
ts, of later origin, apparently but slightly mineralized. Of the veins
ed, three show ore in commercial quantities.
Work was begun January, 1907, and Oct. 31, 1908, the mine had 6,374′
workings, exclusive of stopes. Assessment work has been done along un-
l but highly commendable lines, by sinking 2-compartment shafts, well
bered, at the common end-line of adjoining claims, or, where possible,
he intersecting corners of four claims, thus securing results of actual value
expenditures usually made merely to hold possessory title. Ultimately it
lanned to connect the workings, on all veins, by main crosscuts, between
two working shafts, driving crosscuts at vertical intervals of 200′, these
ing as the main transportation avenues for ores developed, and giving
p extraction while providing for handling heavy ore tonnages.
The oxidized zone apparently is of 500′ to 600′ depth, which indicates an
nsive zone of secondary enrichment carrying chalcocite and bornite, pre-
ably to be followed by chalcopyrite, at great depth. The leached zone
ies mainly carbonate ores, with the bottom workings showing considerable
cocite, ore increasing rapidly in quantity and copper tenor with depth. The
erty has all the ores and fluxes required for a good furnace mixture.
The Great Eastern mine, which is the principal property, as developed,
the only producer as yet, has a 420′ shaft, made from an old vertical
t cut down, and is poorly located, hence eventually must be replaced by
rger shaft to the north, but will serve to develop the property to greater

depth, and will suffice for a considerable production. Levels have been op at depths of 100', 300' and 400', the upper levels showing leached ore, of commercial importance, but the 400' level has a chute of commercial ore long, from the eastern boundary of the Arizona Commercial, beyond which vein carries small lenses of commercial ore, at irregular intervals, for 36 length, these indicating commercial ores at a little greater depth, whil the sub-level, 60' deeper, the ore chute is 320' long, proving that it pitches on the Superior & Boston, making ground rapidly at depth. On the lo level considerable chalcocite is shown, on both the foot and hanging w chalcocite being found in rapidly increasing proportions, with depth. Great Eastern mine had about $500,000 worth of ore developed, Septem 1908, and was a producer of about 40 tons of high-grade ore daily, at the of 1908, stopes being carried only 3 sets high. The Great Eastern mine is especially wet, but has been given a new Prescott pump, in anticipatio an increased inflow of water at greater depth.

The Limestone shaft is 318' deep, with levels at 100', 200' and 300', bottom level carrying a 4' footwall streak of commercial ore, each succes level showing an improvement in both width and character of ore, with p pects of large and rich ore bodies at somewhat greater depth.

The Gardner incline shaft, begun Apr. 4, 1908, at the southern end the property, on the Black Oxide vein, has 3 compartments, each 5x10' size, timbered with 10x10" timber, and was 435' deep Sept. 30, 1908. P have been cut for levels at depths of 100', 200' and 400'. A crosscut, 1908, was 44' in the Black Oxide vein, without reaching the footwall. Black Oxide vein apparently is a continuation of the Buckeye fault, on w the Old Dominion has opened extensive mines on the Buckeye, Carrie and T Blue claims. Equipment of the Gardner shaft is temporary, and it is plan to replace it by permanent equipment with capacity for sinking circa 1,

The portal of the Black Oxide tunnel is about 1,000' southwest of Limestone mine, the tunnel cutting the Black Oxide vein at 670', givin 400' back, with drifts of 96' and 397', both in the oxidized zone, showin vein filling of micaceous hematite, carrying up to 2% copper, indicating phide ore below, and showing a small chute of shipping ore. The Black O is 280' east of the True Blue mine of the Old Dominion, from which h grade ore has been mined, by leasers, for several years.

The Iron King vein, parallel with the others, shows a good iron go and has an old 70' shaft, in leached ledge matter.

Equipment includes hoists at each shaft, with 5,000-gallon and 12,000 lon oil tanks at the Great Eastern mine, petroleum being used extensively fuel. Buildings include a power-house at the Great Eastern, smithy, w house, barn and 12 two-room cottages, for workmen.

The Great Eastern shaft is reached by a 350' spur of the Arizona C mercial Railroad, over which supplies are received and ore shipped.

The company's property has an excellent site for a smelter, easily a sible by a railroad, and with ample water supply available, but further velopment will be secured before the matter of building a reduction p is given serious consideration.

Production was begun February, 1908, within thirteen months after company started work, with shipments to El Paso smelter, and, begin May 1, 1908, the company shipped circa 1,000 tons of ore monthly, sec mainly from development work, to the Globe and El Paso smelters. For t year ending Sept. 30, 1908, production was 6,624 tons of ore, yielding net, a deduction of smelting and transportation charges, $48,210.39, an average return of $7.28 per ton. Ore produced ranged in copper tenor from 5.4% February to 10.64% in September, and in silver tenor from 2.8 oz. silve

ruary to 7.24 oz. in September, the ore improving steadily in both copper silver contents. Production for calendar year 1908 was circa 1,350,000 fine copper. For September, 1908, production was 88 tons blister copper, ing circa $2,500 above all expenses. In November, 1908, a shipment of tons of ore, from the bottom level of the Great Eastern, returned 12.8% per and 11.8 oz. silver, and the last shipment of 1908, in December, gave rns of 16% copper and 20 oz. silver per ton, the steadily increasing per tages of copper and silver being due to the great improvement in ore ies secured at depth.

The company's financial position is notably strong, and the ability of the perty to make considerable ore shipments so quickly, from development rk, speaks eloquently both for the mine and its management. The Superior Boston is a property of exceptional promise and has an excellent manage- nt.

PERIOR COPPER CO. **ARIZONA.**

Dead. Formerly at Tucson, Pima Co., Ariz. Described Vol. VI.

PERIOR COPPER CO. **MICHIGAN.**

Office: 12 Ashburton Place, Boston, Mass. Mine office: Houghton, Hough- n Co., Mich. Quincy A. Shaw, Jr., president; Rodolphe L. Agassiz, vice- sident; Geo. A. Flagg, secretary and treasurer; Jas. MacNaughton, general nager; preceding officers, Alex. Agassiz and Francis W. Hunnewell, direc- s; Jas. Biscombe, superintendent.

Organized July 23, 1904, under laws of Michigan, with capitalization 00,000, shares $25 par. Is controlled, through ownership of 50,100 shares, ght Dec. 31, 1906, by Calumet & Hecla Mining Co. At end of fiscal year, . 30, 1908, had cash assets of $155,231, with total liabilities of $5,846.

Lands, 400 acres, in Section 15, T. 54 N., R. 34 W., between the Baltic Isle Royale mines, and just east of the Section 16 mine of the Atlantic. property carries circa 60,000′ of the strike of the Baltic amygdaloidal bed, a room for 3 or 4 shafts, and has a light overburden, the lode being proven trenches, at intervals of 1,000′, these showing an amygdaloidal bed of to 40′ average width, having extensive carbonate stains, due to weather- with a little fine copper near surface. Property has been trenched to Eastern Sandstone.

The mine is opened by 2 shafts, No. 1, at the north, which is the only t of importance, being sunk in the footwall, insuring solid ground, but ssitating opening the bed by short crosscuts at each level, and, owing to great width of the bed, it is necessary to crosscut along the drifts, at 100′ rvals. As a rule, the drifts are carried approximately in the center of bed, with a view to giving a fair average of values. The Baltic amygda- where opened in the Superior, carries copper impregnations in the foot- , always an evidence of strong mineralization, and there is a conglomerate about 20′ in the footwall, which carries a small amount of copper. The ip-rock is remarkably deceptive in its appearance, as the copper oxidizes ily, and rock is of little promise, after broken a few weeks, but shows h stamp-copper on fresh fractures. The mine shows a marked improve- t with depth. Owing to an intervening triangle of land, owned by other rests, between shafts Nos. 1 and 2, they cannot be connected until the level is reached.

No. 1 shaft, circa 1,200′ south of the northern boundary of the property, about 1,600′ deep, began drifting on the 10th level December, 1908, this ving a lode up to 95′ in extreme width, the shaft having about one mile rorkings, at the end of the year. There is an 18′ horse of trap on the 6th l, which disappears on the level below. This shaft shows improving es with depth, the bottom levels being the best in the mine.

No. 1 shaft has a frame shaft-rockhouse, of the same type as at N and 18 on the Osceola amygdaloidal bed at the Calumet & Hecla, equi including a Westinghouse engine and 2 crushers. The hoist, good for of 1,500′, was taken from No. 20 shaft of the Calumet & Hecla.

No. 2 shaft, 2,540′ southwest of No. 1, and circa 2,400′ from the so boundary, sunk circa 40′ in the footwall, at an angle of 53°, was 235′ d the end of 1908. Work was resumed, July, 1908, when the shaft was cut to 3-compartment size. This shaft has only a temporary equipmen shows no copper, because sunk in the footwall.

Mining equipment includes a combined boiler and engine-house, with for 5 boilers, hoist, and 10-drill and 18-drill air-compressors, all in the house, the boilers having been brought from the old Calumet & Hecla plant at Lake Linden.

Buildings include a warehouse, smithy, changing-house, office and a ber of dwellings for employes.

No. 1 shaft is connected with the main line of the Atlantic Railway 7,000′ spur, built 1908.

The Superior has a 2-year lease on 2 heads of the Atlantic mill, gi stamping capacity of about 700 tons daily. The first mill test, made D ber, 1908, was on circa 950 tons of rock, remaining after discarding 40% of rock broken for the test from the breasts of the 4 drifts on t to 10th levels, inclusive, and returned 48 lbs. mineral, equal to 35 lbs. fi per, per ton, of rock stamped, in addition to which there were heavy t losses, amounting to 7 to 10 lbs. of fine copper per ton, which probab be gradually reduced by adjustment of the washing apparatus at the m the Atlantic plant was devised and adjusted for handling lighter copp is not likely that the Superior will average 35 lbs. fine copper per to it gives every promise of making a very fine mine, of the same gener as the Baltic and Champion, opened a short distance southward, on th lode. The mine is capable of supplying easily 500 tons of stamp-rock and at the end of 1909 should be opened sufficiently to supply 1,000 ton

SUPERIOR COPPER CO., LTD. ONT

Office: 10 Adams Blk., Sault Ste Marie, Ont. Mine office: S Mine, via Algoma Central Railway, Algoma, Ont. Employs 258 men. M. Dyer, president; W. H. Teare, vice-president; F. C. Smith, secreta general manager; Emory W. Clark, treasurer. Organized Sept. 13, 1901 laws of Ontario, with capitalization $1,500,000, increased, 1903, to $2,5 and again increased, 1907, to $3,000,000, shares $10 par; issued, $2,5 Levied assessments, to Sept. 1, 1908 ,of $52,972.75, and on that date had cash on hand, with $12,700 liabilities. The company was organized assessable, but stock was rendered assessable by special act of the pr parliament of Ontario. Annual meeting, second Thursday in June.

Lands, 11 claims, area 800 acres, 8 claims, of 680 acres area, being granted. Property, in an unorganized mining district of Algoma, show ite and chloritic schists, carrying 2 fissure veins, of 10′ and 70′ estimate age widths, traceable circa 7,000′, opened by shafts of 90′, 95′, 115′, and 400′, with about 20 pits and trenches, giving a total of 2,155′ of ings, estimated to show 212,000 tons of ore, with same amount block for stoping, which figures seem high. Ore is mainly chalcopyrite, with chalcocite, having a quartzose gangue, formerly estimated to aver copper, 1 oz. silver and $2.50 gold per ton, but estimated, by present m ment, to average 4% copper, 1 oz. silver and 40 cents gold per ton.

Equipment includes a 150-h. p. steam plant, with 2 hoists and 1 Ingersoll-Sergeant air-compressor. There are 19 buildings, includi

house, smithy, 20x40' wooden machine-shop, changing-house, boarding-house and dwellings.

The 50-ton wooden concentrator has 2 jaw crushers, 2 rolls, 6 Hancock jigs and 4 Wilfley tables.

The property is connected with the Algoma Central Railway by a 4.2-mile standard-gauge private line, laid with 80-lb. steel rails, and equipped with 1 locomotive and 3 cars.

The mine closed down, August, 1904, and resumed circa 1908. Management plans a 500-ton concentrator. Property considered promising.

SUPERIOR MINING CO. **NEW MEXICO.**

Office: El Paso, Tex. Mine office: Lordsburg, Grant Co., N. M. Daniel W. Reckhardt, manager. Lands are in the Shakespeare Range, near Lordsburg. Company begun operations 1899, and in 1900 shipped some ore to El Paso smelter. Was idle at last accounts, but said to plan resumption.

SUPERIOR MINING CO. **NEW MEXICO.**

Dead. Formerly at Cerillos, Santa Fé Co., N. M.

SUPERIOR MINING CO. **UTAH.**

Mine office: Bingham Canyon, Salt Lake Co., Utah. J. E. Dow, manager. Lands, 8 claims, adjoining the St. Joe, with workings said to show ore assaying 2% copper, 35.5% lead, 29.6 oz. silver and 60 cents gold per ton. Company is said to plan sinking a shaft on the Lark side of the mountain.

SUPERIOR MINING CO. **WASHINGTON.**

Office: 407 Truax Bldg., West Superior, Wis. Letter returned unclaimed from former mine office, Berlin, King Co., Wash. J. P. Simon, president and treasurer; B. A. Baerlocher, secretary and superintendent; preceding officers and W. D. Dwyer, directors. Organized 1902, under laws of Washington, with capitalization $2,000,000, shares $1 par. Lands, 4 claims, area 80 acres, and a millsite, 4 miles south of Berlin, in the Miller River district, opened by a 140' tunnel, showing a 5' to 8' fissure vein, carrying some oxidized copper ores, but mainly auriferous, argentiferous and cupriferous pyrite, with talcose gangue, associated with galena, assaying circa 6% copper, 7 oz. silver and $1 to $30 gold per ton. Idle for some years, except for annual assessment work.

SUPERIOR-MONTANA COPPER MINING CO. **MONTANA.**

Office: 604 Rookery Bldg., Spokane, Wash. Mine office: Superior, Missoula Co., Mont. Employs 6 men. L. G. Nash, president; W. P. Smith, vice-president; S A. Matthews, secretary and treasurer; D. A. Buchanan, general manager; L. P Audrle, superintendent; preceding officers are the directors; W. M. Stephen, engineer. Organized July 1, 1907, under laws of Washington, with capitalization $1,500,000, shares $1 par; issued, $175,000. Reported $11,500 on hand Sept. 18, 1908. Annual meeting, August 15th.

Lands, 12 claims, unpatented, area 230 acres, 2 miles from Superior and one mile from C., M. & St. P. Railway, in an unorganized district of Missoula county, showing 2 ore bodies in diabase, of 35' estimated average width, traceable 7,500', carrying auriferous chalcopyrite and pyrite, estimated to average 7.3% copper, 6 oz. silver and $14.67 gold per ton, with a trace of lead. Development is by shafts of 30' and 70', and a 220' tunnel, with 1,260' of workings, estimated to block out 171,000 tons of ore for stoping, which estimate is excessive. Has 4 mine buildings. Company plans continuous development, building a sawmill and a one-mile aërial tram, installing a plant with steam power, air-compressor and hoist, and building a concentrator. Property considered promising.

SUPERIOR & MONTANA MINING CO. **UTAH.**

Office: 317 Quincy St., Hancock, Mich. Mine office: Alta, Salt Lake Co., Utah. Edw. Ulseth, president; Chas. Chynoweth, vice-president; W. Frank James, secretary; John Holman, treasurer; preceding officers, Michael Foley,

SUPERIOR & NEVADA GOLD MINING CO.

Office: 221 Breunig Blk., Superior, Wis. Mine office: S
coln Co., Nev. Hon. W. E. Hailey, president; D. N. Morgan,
L. Thomas, treasurer; B. J. Thomas, secretary; G. W. Hunt
manager. Organized July, 1906, under laws of Arizona, wit
$1,500,000. Lands, 4 claims, area 80 acres, at Searchlight, kno
Solomon group, slightly developed by tunnel, said to carry a 5
argentiferous and auriferous copper and lead sulphides, with s
assaying circa 7% copper and 2 oz. gold per ton. Also has 4
acres, at Crescent, Lincoln county, Nevada, apparently undeve

SUPERIOR & PITTSBURG COPPER CO.

Office: Calumet, Mich. Mine office: Bisbee, Cochise Co.,
circa 750 men. Chas. Briggs, president; Capt. Jas. Hoatson,
dent; Capt. Thos. Hoatson, second vice-president; Louis W.
vice-president and general manager; Peter Ruppe, treasurer; G
bell, secretary; preceding officers, Thos. F. Cole, Geo. E. Tener,
mont, Jr., Chester A. Congdon and Henry R. Rea, directors; H.
tor. Organized June 30, 1906, under laws of Minnesota, wit
$20,000,000, shares $10 par; issued, $15,000,000. Company wa
merger of the Calumet & Pittsburg Mining Co., Junction Mi
burg & Duluth Mining Co. and Lake Superior & Pittsburg Mi
pany ended 1908 owing the Calumet & Arizona circa $1,00
money. Quick assets, Jan. 1, 1908, were $759,150.50, wit
$1,275,087.66, giving a balance of liabilities, in excess of q
$515,937.16. Company and its predecessors have expended ab
on lands, development and equipment.

Lands, 100 claims, patented, largely fractional, area 1,35
ing 44 claims, area 629 acres, formerly held by Lake Superio
21 claims, area 325 acres, formerly held by Calumet & Pittsb
area 215 acres, formerly held by Pittsburg & Duluth, and 18 c
acres, formerly held by the Junction. The major portion o
tract is covered by Bisbee conglomerate, flanked on either sid
and limestone.

The property shows extensive areas of leached ore, pr

The Cole shaft, formerly known as No. 2 Lake Superior & Pittsburg, was sunk nearly 1,000′ by the former owners, and was cut down to 3-compartment size, 8x24′ in outside measurement, and retimbered, by the present management, work being begun, simultaneously, on 10 levels, and performed in record-breaking time. This shaft was 1,480′ deep at the end of 1907, and apparently was not deepened, 1908. The Cole shaft also affords the principal avenue of ore extraction from that part of the mine formerly owned by the Pittsburg & Duluth. The shaft shows considerable ore bodies on the 900′, 1,000′ and 1,100′ levels, ore improving with depth. This shaft has Prescott and Cameron station pumps, caring for a flow of 225 gallons per minute, and, at the end of 1908, was shipping 7 carloads of ore daily.

Equipment at the Cole shaft includes an 800-h. p. steam plant, burning petroleum, and a 16-drill air-compressor. There is a 16x42″ Nordberg quadruple-cylinder incline-frame double-drum hoist, capable of raising 12-ton loads from a half-mile depth, hoisting 3-deck cages carrying 3-ton cars, operating in balance, or singly, as desired, and the engine can be altered to hoist from a depth of 2,500′. Buildings at the Cole shaft include a framing-mill, smithy, office and changing-house.

No. 1 Lake Superior & Pittsburg shaft is a relic, left by former owners, of no particular use to the present company, the shaft being of small size and shallow depth.

No. 3 Lake Superior & Pittsburg shaft, 1,000′ deep, is on the Uncle Sam claim, south of the Cole shaft, and has been idle several years.

The Briggs shaft, 1,271′ deep at the end of 1907, is circa 2,000′ south of the Junction shaft, and about 3,000′ east of the Lowell shaft of the Copper Queen. This shaft shows tremendous bodies of the leached ore that has been found capping the big ore bodies of adjoining mines. The first level, at 910′, shows 600′ of good ore. The Briggs shaft has an 8″ air-line, and two 12″ water-columns, with 3 pumps.

Equipment at the Briggs shaft includes a steel gallows-frame, and a power plant, installed 1906, having 7 boilers, 5 of 250-h. p. each, burning crude petroleum, with a powerful hoist and an 18-drill Sullivan straight-line air-compressor.

The Hoatson shaft, on the Del Norte claim, circa 2,500′ from the Briggs shaft, has 4 compartments, and was 1,427′ deep at end of 1907, collar being 150′ higher than that of the Junction shaft. This shaft shows tremendous bodies of leached ore, with some cuprite and other oxidized ores, on the 12th level, and in the bottom workings carries high grade oxides and sulphides, similar to those found in the Lowell shaft of the Copper Queen. At the end of 1908 stations were being cut, on the 1,400′ and 1,500′ levels, and the Hoatson shaft was producing, daily, 2 carloads of oxidized ores, and 6 carloads of sulphide ores. There is a 1,000-gallon pump on the 1,300′ level.

Equipment at the Hoatson shaft includes a 50′ gallows-frame and a double-drum hoist, good for 1,500′ depth. The power plant has 6 boilers, and there is a framing mill, which is a duplicate of that at the Oliver shaft of the Calumet & Arizona.

The Congdon shaft, developing the Pittsburg & Duluth tract, on the Black Bear claim, only 650′ from the Calumet & Arizona mine, is 1,267′ deep, and out of commission, as the territory can be worked to better advantage through the Cole shaft. The Congdon shaft has a 1,000-gallon pump, in a station on the 1,000′ level. Surface equipment includes a 300-h. p. steam plant, with a 12x36″ double-drum hoist and a 5-drill straight-line air-compressor.

The Powell shaft was begun, late 1908, on the line of the Hope and Wagner claims of the *Calumet & Arizona*, on ground formerly owned by the Pitts-

burg & Duluth. Equipment includes a Hendrie & Bolthoff double-dru Sullivan air-compressor and two 75-h. p. Atlas boilers.

The 4-compartment Junction shaft, 1,535' deep at the end of 1908, on the boundary line of the Calumet & Pittsburg and Junction tract 1,300' level shows a great deal of ore assaying up to 9% copper, and th level, at the end of 1908, showed ore assaying above 11% copp posed to be a continuation of the ore body on the 1,300' level of th son shaft. The Junction was shipping, at the end of 1908, from b 1,300' and 1,400' levels.

The entire mine is drained through the Junction shaft, which a to assist in unwatering adjoining properties. The pumping station 1,200' level has pumps of 4,500 gallons capacity per minute, and hand water of the entire mine. A pumping station on the 1,500' level, co late 1908, has a 2,500-gallon Prescott pump, transferred thereto fr 1,200' level.

The Junction has a 75' steel gallows-frame, planned for 5 compar The power plant includes a 16x42' Nordberg 4-cylinder incline doubl hoist, good for 1,500' depth, which is a duplicate of that at the Cole There also are 12x14" and 12x15" auxiliary hoists, and 2 cross-compou compressors, of 12 drills aggregate capacity, with ten 250-h. p. marine and three 5,000-gallon tanks for storage of petroleum. There is a lar chine shop at this shaft.

The property is served by the El Paso & Southwestern Railway, reaches all the main shafts and shops of the mine.

Ore is smelted by the Calumet & Arizona, a sister company. Prod 1906, was 9,084,875 lbs. fine copper, 32,564 oz. silver and 143 oz. go precious metals, valued at $21,941, amounting to average of $4.80 per finished copper. Production, 1907, was 111,710 tons of ore smelted, re 9,691,405 lbs. fine copper and 55,464 oz. silver, with a small amount o the precious metals returning $33,401.20, equal to $6.90 per ton of coppe

Despite the great cost of developing this mine, and the unusual of time taken, it is a valuable property, of much promise, though it ha much more time and money to open than anticipated by anyone, at th The management is excellent.

SUPERSTITION MOUNTAIN MINING CO. **ARI**

Mine office: Florence, Pinal Co., Ariz. Geo. Woodbury, superint Lands, 30 claims, circa 30 miles north of Florence, showing promising outcrops.

SURE THING GOLD-COPPER MINING & SMELTING CO. **WASHIN**

Dead. Succeeded, circa 1905, by Clipper Mining Co. Formerly at Bend, King Co., Wash. Described Vol. V.

SURPRISE EAGLE MINING CO. **MON**

Office: Silver Bow Blk., Butte, Mont. Mine office: Boulder, J Co., Mont. T. D. Thomas, president and general manager; Jas. W. Ro president; Sidney E. Roberts, secretary. Capitalization, $1,500,000. L claims south of the Elkhorn mine, and 4 claims south of the Baltimor

SUTTON MINING CO. **NEW M**

Office: Elgin, Ills. Mine office: Lordsburg, Grant Co., N. M. R. A manager. Property is the Last Chance mine, in the Pyramid district, a 100' shaft showing a 7' vein carrying gray copper.

SVANO COPPER & SULPHUR MINES (NORWAY), LTD. **NOR**

Office: Gresham House, Old Broad St., London, E. C., Eng. Org June 22, 1907, under laws of Great Britain, with capitalization £15,0 25,000 preferred and 5,000 deferred shares, of 10s. par each. Was organi

quire a mining concession on the island of Svanöen, on the southwestern st of Norway. Presumably idle.

AKOPMUNDER MINEN- GESELLSCHAFT. GERMAN SOUTHWEST AFRICA.

Office: Schellingstrasse 4, Berlin, W9, Germany. Mine office: Corob, via akopmund, German Southwest Africa. Capitalization 36,000 marks. Prop- y is sundry slightly developed copper prospects. Idle and presumably ifound.

ANSEA CONSOLIDATED MINING CO. UTAH.

Office: Provo, Utah. Mine office: Eureka, Juab Co., Utah. Jesse Knight, sident. Organized circa June, 1908, under laws of Utah, with capitalization 00,000, shares $1 par, as a merger of the Swansea and South Swansea Min- companies.

ANSEA EXTENSION MINING CO. UTAH.

Office: Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. L. Thomas, president; Hon. O. W. Powers, vice-president; Heber M. Wells, retary and treasurer. Organized circa June, 1908, under laws of Utah, with pitalization $100,000, shares 10 cents par.

ANSEA MINING CO. MEXICO.

Dead. Lands sold, September, 1905, to Ronquillo Copper Co. Formerly La Cananea, Arizpe, Sonora, Mex.

ARTHMORE CONSOLIDATED MINING CO. COLORADO.

Office and mine: Eldora, Boulder Co., Colo. Employs 10 to 70 men. Chas. Galbreath, president; Harvey Hanes, vice-president; J. E. Carpenter, secre- y; Paul Barriclow, treasurer; H. H. Carpenter, general manager. Organ- d July, 1907, under laws of Colorado, with capitalization $3,500,000, shares par; issued, $3,000,050, as a merger of the Swarthmore Copper Co. and terprise Mining Co.

Lands, 17 claims, 11 patented, area circa 60 acres, in the Grand Island ning district of Boulder and Gilpin counties. Property includes the Golden ece mine, having 2 ore bodies under development, one, of 8′ estimated aver- width, carrying auriferous and argentiferous chalcopyrite, calaverite and anite, the copper ores being estimated to average 3 to 5% copper and 3 4 oz. silver, with fair gold values. Milling ore is estimated to carry $10.84 smelting ore $24 per ton, in average metallic values. Development is by hafts, deepest 403′, and by tunnels of 800′, 1,000′ and 2,000′, estimated to e 63,000 tons of ore blocked out for stoping. Equipment includes two am plants, one with a 60-h. p. hoist and 12-drill air-compressor. There are ew mine buildings.

ARTHMORE COPPER CO. COLORADO.

Dead. Merged, circa 1907, in Swarthmore Consolidated Mining Co. For- rly at Eldora, Boulder Co., Colo.

ASTIKA COPPER CO. ARIZONA.

Office: Long Beach, Cal. Mine office: Jerome, Yavapai Co., Ariz. N. Pike, sident; Walter Thompson, vice-president; T. C. Jordan, secretary. Organ- d December, 1907, under laws of Arizona, with capitalization $3,000,000, ares $1 par, as successor of Long Beach & Arizona Mining Co. Reorganiza- n was said to have been effected to eliminate certain stock interests, on ac- unt of an alleged illegal stock issue.

Lands, 10 claims, including 3 held under bond and lease, circa 10 miles ith of Jerome, carrying auriferous copper ore, opened by a 150′ tunnel and ifts of 150′ and 250′. The Rawhide group, 7 claims, near Yaeger Cañon, 8 les southwest of Jerome, is opened by shafts of 150′ and 165′. Idle since vember, 1907.

SWASTIKA COPPER MINING CO. MONT

Office: Missoula, Missoula Co., Mont. Mine office: Superior, Mi Co., Mont. Employs 8 men. Thos. N. Marlowe, president; J. W. MacD vice-president and general manager; Geo. E. Marlowe, secretary; Th Marlowe, treasurer; E. P. Kribs, engineer. Organized July, 1907, unde of Montana, with capitalization $150,000, shares 10 cents par; fully issue

Lands, 10 claims, unpatented, area 200 acres, and a 5-acre millsit timbered, in the Carter district, showing 2 parallel veins, of 6" to 8" in traceable one-half mile, carrying paystreaks of 2" to 4", containing mal bornite and chalcopyrite, said to give assays of 17 to 32.5% copper, oz. silver and from a trace to $6.40 gold per ton, and estimated, by co to average 35% copper, 112 oz. silver and $6.40 gold per ton. Devel is by tunnels of 60', 160' and 270', with 12 trenches. Company plan tinuous development.

SWASTIKA COPPER & SILVER MINING CO. ARI

Office and mine: Tucson, Pima Co., Ariz. W. K. Royce, president; Cochran, vice-president; J. S. Hopley, secretary; J. M. Ormsby, tre Capitalization $1,500,000, shares $1 par. Lands, 24 claims, unpatent cluding the Swastika group of 14 claims and the Calendar group of 10 circa 3 miles south of Olive camp. The Swastika group carries silv ores and the Calendar group silver-copper ores. Has 360' of workin employs horsepower.

SWEDEN COPPER CO. WASHIN

Dead. Merged, circa 1903, in Mt. St. Helens Consolidated Min Formerly at Spirit Lake, Skamania Co., Wash.

SWISHELM DEVELOPMENT CO. ARI

Mine office: Benson, Cochise Co., Ariz. Lands, 40 claims, in th helm Mountains. Idle and presumably moribund.

SWISS GIRL MINING CO. ARI

Dead. Lands sold, circa 1901, to Baumann Copper Co. Formerly at Yavapai Co., Ariz.

SYCAMORE MINING, SMELTING & DEVELOPMENT CO. ARI

Office: Fort Worth, Tex. Mine office: Jerome, Yavapai Co., Ariz. Stover, president; H. Martin, vice-president and superintendent; W. I iams, secretary and treasurer; preceding officers, Henry O'Toole, H. and C. R. Knutson, directors; Max Winchel, foreman. Organized und of Arizona, with capitalization $1,000,000, shares $1 par.

Lands, on the Verde River, are distant from Jerome 4 miles in line, and 13 miles by wagon road. Mine has a 325' two-compartmen bottomed in low grade chalcopyrite, assaying 1 to 3% copper, which p will be abandoned by reason of trouble from gases and foul air. Has ore assaying 7% copper, 6 oz. silver and $18 gold per ton. Equipm cludes necessary mine buildings and a good steam plant. Was diamon ing at last accounts.

SYLVANIA GOLD & COPPER MINING & MILLING CO. WYO

Dead. Formerly at Centennial, Albany Co., Wyo.

SYNDICATED DEEP MINES, INC. WASHIN

Office: Spokane, Wash. Mine office: Republic, Ferry Co., Wash. Anderson, president; M. J. Costello, vice-president; J. E. McFarland tary and treasurer; J. L. Harper, general manager and chairman ex board; Neil Cochrane, superintendent. Organized September, 1907, und of Washington. Lands include the Lone Pine-Surprise and Pearl Conso mines, also a bond and lease on the Manila mine, which is said t considerable copper. Property was reopened and shipments to Granby begun, March, 1908. Plans sinking shaft to depth of 1,000'.

CATED DEEP MINES, INC. **WASHINGTON.**
ce: Wallace, Idaho. Mine office: Saltese, Missoula Co., Mont. Or-
1906, with capitalization $1,500,000, shares $1 par. Lands, 6 claims,
miles northwest of Saltese. Presumably idle.

ACACHI MINING CO. **MEXICO.**
ie office: Moctezuma, Sonora, Mex. R. O. Fife, superintendent. Has
us and argentiferous copper ores.

S-FINANA COPPER CO., LTD. **SPAIN.**
id. Voluntarily wound up, December, 1901. Formerly at Tablas, Granada,

MOUNTAIN COPPER CO. **ARIZONA.**
ter returned unclaimed from former mine office, Kelvin, Pinal Co.,
s controlled by Arimex Consolidated Copper Co., through ownership of
stock issue. Lands, 27 claims, in the Bunker Hill district. Long idle
small promise.

ÑIA MINERA EL TABOR y ANEXAS. **MEXICO.**
ce: Mexico, D. F. Mine office: Asientos, Ocampo, Aguascalientes,
Antonio Morfín, president; Bruno Newman, manager. Has secured ore
g up to 43% copper, with good silver and gold values.

DAD BENEFICIADORA DE METALES DE TACNA. **CHILE.**
rks office: Tacna, Tacna, Chile. Organized Jan. 10, 1901, under laws
, with capitalization 68,250 pesos, shares 250 pesos par. Property is
r, which, in 1903, treated 4,066 metric tons of ore, producing therefrom
kilograms of ejes averaging about 50% copper tenor, carrying 806,839
copper.

A CO. **BRITISH COLUMBIA & WASHINGTON.**
ce: Tacoma, Wash. Mine offices: Van Anda, Texada Island, B. C.,
rrington, Snohomish Co., Wash. A. Grant, general manager. Capital-
$3,000,000, reduced from $5,000,000. Paid a $35,000 dividend, Apr.

ds include a gold-copper mine at Darrington, idle for several years,
s of iron ore lands on Redonda Island, British Columbia, 4,000 acres
s carrying coke and coal in Washington, and the Marble Bay mine,
) acres, crown-granted, which was bought for $150,000. Profits from
e are said to have paid for the property in 3 years. Mine, about
th mile from the Cornell and Copper Queen mines, has ores of similar
r and occurrence, found mainly in large chutes, carrying argentiferous
and chalcopyrite, averaging circa 5% copper, 2 oz. silver and $1 gold
Development is by several tunnels and shafts, main shaft being 860'
ith 10th level, opened at bottom, showing auriferous bornite of good
both copper and gold, values increasing with depth. Shaft has a 90'
frame, with steam and electric power.
oncentrator, of 150 tons daily capacity, is connected by a 2,125' aërial
th ore bunkers on Sturt Bay, but has been idle several years, ore being
ected on sorting tables, before shipment. The Marble Bay property
a limestone quarry and 4 kilns, with daily capacity of 300 barrels of
Mine employs 60 men, and in 1907 shipped 6,237 tons of ore, carrying
)0,000 lbs. fine copper, production being only about 60% of normal
of a miners' strike and low price of copper. Mine considered valuable
nagement good.

A SMELTING CO. **WASHINGTON.**
ce: 71 Broadway, New York, N. Y. Works office: Tacoma, Pierce
sh. Employs 675 men. W. R. Rust, president, treasurer and general
r; Edw Brush, vice-president; D. Craig, secretary; F. W. Clark, assist-
nager; L. J. W. Jones, general superintendent; preceding officers and

E. B. Braden, directors; T. R. Wilkinson, refinery superintendent; Roger T assistant superintendent copper smelter; R. F. McElveney, assistant su tendent lead smelter.

Organized 1898, under laws of Washington, with capitalization $5 shares $1 par. Is controlled, through stock ownership, by American S Securities Co.

Lands include an extensive and well located smelter site, 6 mile Tacoma, on Puget Sound. The property is on tidewater, and tidal fl being reclaimed, by filling in with slag. There are extensive wharv ore-bunkers and automatic devices for unloading cargoes, a small electr line connecting the wharves with all departments of the works.

The smelter, of 1,200 tons daily capacity, built originally of 3 capacity, for lead ores only, now treats lead mattes, and copper, lea and gold ores and concentrates from the entire western coast of North A and even does a considerable business on South American ores.

The smelter has three 60-ton mechanical roasters, and two 10-to roasters, in addition to which a limited amount of ore is heap-roasted are 6 blast-furnaces, including four 100-ton stacks, used for lead smelt a 400-ton water-jacket blast-furnace for copper, 42x160" at the tuyer forehearth 14' in diameter and 4' high, holding 60 tons of molten m 36" cupola remelting furnace, with outside settler, can treat 75 tons matte daily. The reverberatory furnaces are of 350 tons daily capa there is a circular slag-casting machine, having 144 tilting molds. T dust-flues of the blast and reverberatory furnaces lead to a 306' stack, forced concrete.

The converter department, equipped with a 30-ton electric traveli has 2 stands and six 72x100" shells, of barrel type.

The works include a 35-ton electrolytic refinery, having a 20-ton traveling crane, for handling anodes and cathodes.

The works use electric power mainly, a 40,000-volt current, tra to the works, being stepped down, at the plant, to 100 volts, for v works require about 2,000 electric h. p., and fuel is petroleum, brou the oil fields of southern California in tank steamers. The lead furna blast furnished by 3 Connersville blowers, driven by a 200-h. p. West induction motor.

The management of the Tacoma smelter is progressive, and th lurgical practice good, this being one of the most important custom on the Pacific coast.

TADERGOUNT MINE. A

Mine office: Takitount, Philippeville, Algeria. Is owned by Sto et Cie. Property carries veins of tetrahedrite, presumably argentife oxidized copper ores in schist and limestone. Mine, slightly devel been abandoned at various times, owing to excessive inflow of w 1905, with a force of 80 men, produced 150 tons of ore, sent to St. Rhône, France, for smelting.

TAKARA MINE.

Office: Takara-mura, Minami-tsurugori, Kai, Japan. Production as follows: 417,123 lbs. fine copper in 1903; 541,065 lbs. in 1906, an lbs. in 1907.

TAKILMA SMELTING CO. C

Office: P. O. Box 1487, Colorado Springs, Colo. Works office: Josephine Co., Ore. Chas. L. Tutt, president; K. R. Babbitt, vice-p J. A. Hull, secretary and treasurer; Geo. Crerar, manager; C. J. Murph intendent. Organized under laws of Colorado, with capitalization shares $10 par.

ls, 175 acres, 160 acres patented, also a 160-acre smelter site, with ldings of 335 acres, in the Waldo district, including the Queen of nd Cowboy mines. The mining property shows diorite and serpentine, several veins, with north and south strike, of which 3 are more or loped. The company has a sawmill.

Queen of Bronze mine carries heavy auriferous copper sulphides, said, mer management, to assay 12 to 60% copper, which figures would un- y be cut heavily by the present owners. Development is by a 150′ d by tunnels of 200′, 640′ and 150′, with several thousand feet of , estimated, 1906, to show circa 20,000 tons of oxidized and sulphide ing average assays of circa 8% copper and $2.50 gold per ton, with up to 50% in copper tenor.

Cowboy mine, developed by a 310′ tunnel connecting with a 160′ in- ft, carries mainly oxidized ores.

smelter, at Takilma, receiving ore by wagon and tram-line, has a water-jacket blast-furnace, making matte averaging 45% copper, 2.5 and $2.50 gold per ton, shipped to the Tacoma smelter for refining. supply is somewhat uncertain, and in 1907 the works imported Jap- te, packed in 100-lb. bags.

g to heavy rains in fall and winter, causing impassable roads, the is worked only in summer, the nearest railroad point being Grants miles distant During the active season 60 teams are employed, to matte and haul in coke and supplies.

uction, 1905, was 7,543 tons of ore smelted, yielding 1,563 tons of about 45% copper tenor, indicating average returns of 8% copper smelted. Production, 1907, was 499,662 lbs. fine copper. The man- is good, and with rail connections, very badly needed, the property come of some importance.

AN MINING CO. **UTAH.**

l. Former office was at Salt Lake City, Utah, with officers as follows: Keon, president; Jas. Ingebretzen, vice-president; J. W. Stringfellow, and treasurer; preceding officers and Frank Knox, directors. Was 1906, with capitalization $300,000, shares $1 par. Lands were 11 claims, carrying mainly silver and silver-lead ores. Was merged, 1908, in Cedar-Talisman Consolidated Mines Co. Formerly in Beaver Utah.

OOSA COPPER MINES. **GEORGIA.**

l. Succeeded, Jan. 24, 1905, by Georgia & Tennessee Copper Co. at Temple, Haralson Co., Ga.

NIA DE MINAS Y BENEFICIADORA DE TALTAL. **CHILE.**

e: Valparaiso, Chile. Mine office: Taltal, Antofagasta, Chile. Or- May 31, 1902, under laws of Chile, with capitalization 500,000 pesos, pesos par

. RAILWAY CO., LTD. **CHILE.**

e: 32 Great George St., Westminster, London, S. W., Eng. Works Taltal, Antofagasta, Chile. Organized circa 1907, as successor of melting Co., Ltd.

ls, in the Canchas district, 30 miles from Taltal, carry a fissure vein 40″ width, showing carbonate copper ores, with ferruginous gangue, erty being but slightly developed, at last accounts.

smelter, rebuilt and blown in March, 1904, is served by the Taltal a spur of which enters the works, the main line of which runs near . The smelter has revolving calciners, an 80-ton water-jacket blast- 30x72″ at the tuyeres, 2 reverberatory furnaces, and a casting furnace. n, 1905, *under old management*, was circa 3,700,000 lbs. fine copper.

TALYSARN COPPER MINES, LTD.

Mine office: Nanttle Vale, Talysarn, Carnarvon, Wales. Organ 23, 1907, under laws of Great Britain, with capitalization £60,000, shar

TAMA MINE.

Mine office: Bastia, Corsica. In 1906 produced 385 tons of copper ore, shipped to Great Britain for reduction.

TAMARACK JUNIOR MINE.

Owned by Osceola Consolidated Mining Co.

TAMARACK MINING CO.

Office: 303-199 Washington St., Boston, Mass. Mine office: Houghton Co., Mich. Works office: Hubbell, Houghton Co., Mich. circa 1,500 men. Albert S. Bigelow, president; Hon. Norman W. H president and general manager; Wm. J. Ladd, secretary and trea ceding officers, Edw. S. Grew, J. Henry Brooks, Jos. S. Bigelow and Anthony, directors; Wm. J. Uren, general superintendent; John assistant superintendent; Chas. D. Hohl, chief engineer; John T. R eral clerk and purchasing agent; Wm. Harris, chief clerk; A. Lineo mill superintendent; H. B. Claussen, superintendent motive power; ters, chief mining captain; John Rowe and Wm. Rosevear, mining

Organized 1882, under laws of Michigan, with capitalization shares $25 par. Began dividend payments, 1888, and, to end of 19 dividends, aggregating $9,420,000. Dividends were $300,000 in $420,000 in 1907. Loss on operations, 1907, was $249,277, and oper probably resulted in a small deficit. Annual meeting, first Thursd

Lands, 1,120 acres, in Sections 10, 11, 14 and 15, Town 56 No 33 West, also the Cliff mine, in Keweenaw county, a millsite on T and miscellaneous timber lands and other realty, giving total lande of 8,640 acres.

The Tamarack mine proper is a tract of very irregular outlin on all sides by lands of the Calumet & Hecla, and the mine is ope underlays of the Calumet conglomerate and Osceola amygdaloidal mine was planned by the late Capt. John Daniell, who conceived opening the underlay of the conglomerate by a deep vertical sha work of sinking No. 1 shaft was begun 1882, and the conglomera 1885, three and a half years later, at a depth only 10′ greater tha mate of Capt. Daniell, made before the first sod was removed.

The mine is opened by 5 shafts. The South Tamarack incl Nos. 1 and 2, the original openings, while Nos. 3 and 4 are known a Tamarack, and No. 5, the newest shaft, is about midway betwee and south workings. Nos. 3 and 5 shafts are connected on a le the 38th in No. 5 and the 16th in No. 3. All shafts are connected u giving improved ventilation. The mine, as a whole, uses about 75 p and, in 1907, made 6,221′ of new openings. Sub-levels are opened cessive use of timber, and stope-drifts are opened, 12x12′ in size. are in use, saving much timbering. The entire system of minin changed, and stopes are now left with light timbering, permitting th to cave after ore is extracted. Since the earthquake of 1905, th water has been considerably increased. The company's operatio ducted extensively on the Osceola amygdaloid, as well as on the C glomerate, the latter showing decreased values with depth.

No. 1 shaft, 3,409′ deep, not deepened for some years, cuts t conglomerate at depth of 2,270′, and also cuts the Osceola amy about 1,000′ greater depth. In this shaft, as in all others, the va are reached by crosscuts, except at the actual point of intersection, ing to both the conglomerate and amygdaloidal beds. The normal

pacity of No. 1 shaft is 400 tons daily. This shaft has 2 Nordberg direct-ing duplex pumps, on 6th and 9th levels, these having Corliss steam-ends, h with capacity to lift 600 gallons per minute from the 9th level. A fire t broke out January, 1906, on the 22d level of No. 2 shaft, burned itself August, 1907, in No. 1 shaft, lasting for 19 months, after which No. 1 ft was repaired and retimbered. This fire cost about $200,000. Equipment No. 1 includes a powerful hoist, good for the life of the shaft.

No. 2 shaft, 4,355' deep, not deepened for several years, is a short distance theast of No. 1, and was straightened and retimbered, 1904, being given ouble lining, with the inner wall braced against the outer by timbers of ying lengths, which can be shortened or replaced from time to time. The in this shaft, 1906-1907, caused considerable damage, and necessitated mbering, but the shaft has been a producer since Jan. 16, 1907. No. 2 has owerful hoist and the management plans swinging Kimberley skips under cages.

No. 3 shaft, 5,253' deep, nearly a mile north of No. 1, is the deepest in the d, a 30' winze sunk near the shaft having its bottom 3' more than a mile ically below the earth's surface. This shaft cuts the Calumet conglom-e at a vertical depth of 4,185', where the bed is 20' to 25' wide, but irregu-n values, and far from rich, though payable, as a rule, normal productive acity of the shaft being circa 1,000 tons daily. A sub-shaft, starting from 14th level, was begun, 1908. No. 3 shaft has mechanical haulage on the , 16th, 17th, 31st, 32d and 35th levels. Haulage is by endless rope, with ngine actuated by compressed air, and the management plans installing a er haulage engine, 1909, on the 18th level.

No. 3 shaft has an Allis-Chalmers hoist, formerly having a double conical n, of 13' 6" diameter at either end and 36' 9" diameter in the center, the e winding over specially built-up runs of steel, affixed to the surface of drum, which worked in counterbalance. A new drum replaced the old, , the discarded drum being nearly worn out. About 20,000 rivets were oved in replacing the drum, as the old drum had to be raised and the hubs n off, and the shaft, weighing 65 tons, also had to be raised. The new n is similar to that of No. 5 shaft, being semi-conical, with 18' maximum neter. The old hoist raised, on test, a 10-ton load, vertically, at a speed 5 miles per hour, and, running at that rate, the cage was stopped in a ance of 75'. Equipment at No. 3 shaft includes a 60-h. p. fan, 10' in neter, with blades 3' 6" wide, capable of supplying 192,000 cubic feet of air per minute, to the depth of the shaft, not only ventilating the mine, also aiding in reducing the temperature, which otherwise would be nearly F., in the bottom levels. There is a 32x72" Nordberg auxiliary hoist, with 8' 6" drum having lathe-turned grooves for coiling the cable, this hoist g used for lowering and raising men and timber in No. 4.

No. 4 shaft, 600' northeast of No. 3, is 4,450' in depth, and has not been ened since bottomed, 1895. Occasional good ground is shown, but the t, as a whole, is poor. Underground connection is had with No. 3, giving ilation, and an emergency exit. No. 4 shaft is used exclusively for hoist-water, lowering and raising men, and for purposes of ventilation and ty. A new concrete lining was substituted, 1904, for the old wooden tim-g through the overburden. The old shafthouse was replaced, 1908, by a frame structure, and a large ventilating fan was taken from No. 1 and lled at No. 4 shaft.

No. 5 shaft, about 3,300' southwest of No. 4, and about midway between ld Tamarack and North Tamarack workings, is the newest and largest in the mine, being 5,089' deep. Sinking was begun Aug. 2, 1895, and onglomerate was cut Dec. 20, 1901, at vertical depth of 4,062', the late

Capt. Wm. E. Parnall having foretold the depth within 12′, and the time required within 11 days, when the work was begun, 6 years previously. This shaft is connected underground with the workings to the north and south.

No. 5 shaft is 7x29′, inside measurement, with 5 compartments in a row. The three central compartments, 5′x7′ 2″ each, are used for cages. One of the end compartments, also used for a cage, is 7′ 2″x5′ 4″, the extra 4″ being allowed for timber strain, while on the other side of the shaft is a compartment 3′x7′ 2″ for ladders, pipes and wires. The 10x14″ wall-plates of this shaft are 29′ 2″ long, and the 5x7″ runners, serving as guides for the cages, are 16′ to 22′ in length. Instead of lag-screws being countersunk, the runners have a central groove, 2″ wide and 1½″ deep, running from top to bottom on both sides of each of the 4 hoisting compartments, these grooves providing for the escape of loosened lag-screws, without damage to cages or runners. The shaft openings have automatic covers that lift for passage of the cages. In sinking this shaft, 83 separate trap, amygdaloidal and conglomerate strata, all barren, were cut before the Calumet conglomerate was reached. The north drifts on the 35th, 36th and 37th levels have been carried to the Calumet & Hecla boundary. As a whole No. 5 shaft is decidedly low in grade, although the conglomerate is of good average width.

The shafthouse and rockhouse at No. 5, built by the Wisconsin Bridge & Iron Co., at a cost of nearly $100,000, are on separate foundations and are separately framed and braced, although apparently standing as one building, 56x120′ on the ground, with an extreme height of 131′. The foundations are exceptionally massive, and the girders and framing are of unusual strength, to withstand the great strains caused by hoisting heavy cages, and the operation of powerful rock-breaking machinery. These buildings required about 700 tons of steel and 100 tons of corrugated iron siding in construction. Although 10 carloads of lumber were used in the building, no wood is exposed, except in the floors, asbestos sheathing-paper being used elsewhere to protect the wood, thus rendering the building practically fireproof. The rockhouse has 3 Portage Lake crushers of the reciprocating jaw type, with room for 5 more when needed.

Surface equipment at No. 5 is the most extensive at any shaft, including engine-house, boiler-house and compressor-building of redstone, with steel truss roofs. The engine-house has 2 duplicate 6,500-h. p. Nordberg hoists, each with four 36″ high-pressure cylinders, having 72″ stroke. The drums are 24′ in diameter, in the center, tapering to 16′ at the ends, each half carrying 6,500′ of 1½″ steel cable, the hoists operating in counterbalance, and being capable of raising, from 6,000′ depth, a net load of 6 tons of rock, this having a gross weight, with cage and cable, of about 12 tons. The hoists cost $60,000 and $90,000 respectively. The boiler-house has six 200-h. p. Burt boilers, with 84″ shells, and two 115′ brick-lined self-supporting steel smokestacks. Coal is delivered to the boiler-room from a railroad trestle.

The 50x75′ redstone compressor-house at No. 5 has a 35-drill Ingersoll-Sergeant 2-stage cross-compound air-compressor, with 18″ and 34″ steam cylinders and 36″ stroke, and a 100-drill triple-expansion Nordberg compressor with 19x53x48″ steam cylinders and 2-stage air cylinders of 18x27x48″.

The electric plant at No. 5 shaft has a 150-kw. generator, and transmits energy to all branches of the mine. Miscellaneous buildings at No. 5 shaft include a stone dry and smithy, and there is an extensive timber yard, on ground filled and graded for the purpose, the site having been swampy originally. There is a large machine-shop, doing work for practically all of the Bigelow mines.

Water for steaming purposes and domestic use is pumped from Lake *Superior*, against a head of nearly 700′. The pumping station, nearly 5 miles

of the mine, is 60x80′ in size, of brick with steel frame, housing two gallon pumps, that take water from a 40′ well on the lakeshore, connected with a tunnel driven 480′ under the bed of the lake, with intake about water-level. Water is delivered by the pumps into 2 steel tanks, 65′ diameter, standing on the highest ground of the mine location, ing a combined storage capacity of 200,000 gallons, water being discharged through the mains from these standpipes, and to the Osceola mine loca-

ompany owns and operates a hospital, 60x60′ in size, with 2 stories, and attic, basement and first floor being of selected Lake Superior upper story and attic of wood, with interior finish of selected quarter-orgia pine. The building has a sun-veranda, elevators and indirect ting.

is a private branch telephone exchange, with instruments at the pump stations in the mine, and in the various offices, shops and mills. ompany has made tentative plans for a large central electric power Dollar Bay, on Portage Lake, but, owing to uncertainty as to the several of the Bigelow mines, now in dispute, this matter has been eyance.

liff mine, owned by the Tamarack, includes the Cliff proper and the I, which were connected underground, June, 1908, on the 3d level. mine, only a short distance northeast of the Ojibway, is the oldest ie Lake Superior district, having been opened 1846, closed 1870, and 1872, but abandoned 1878. The Cliff paid dividends of $2,518,620, to 1879, inclusive. The mine was opened on a fissure vein, which y thoroughly worked out before the property was abandoned, and much silver, perhaps the most of any Michigan mine.

Tamarack secured a complete geological cross-section of the Cliff diamond drilling, 1903-1907. The property carries about 20 amygda-s, under the greenstone bluff, which is such a prominent feature of ape, rising to a height of several hundred feet. The Cliff lands pre-arry the northern extension of the Kearsarge lode. The old Cliff 4 shafts, No. 1 being at the base of the bluff, No. 3 at the edge of nd No. 4 several hundred feet back to the north, all in line, on the n, while the Avery shaft, sunk 40′ to the eastward, was used for-men, timber and pumps. Work was begun, through No. 1 South , about 1,000′ south of the Avery shaft, and in line with Cliff shafts nd 4. Old No. 1 South Cliff shaft had been idle circa 50 years, and leep. The shaft had been unwatered, June, 1908, down to the 6th ing 2 more levels to unwater. The Avery shaft is 480′ deep, with opened at 40′ intervals. In 1907 the management partially cleaned shaft, and on the 3d level, at depth of 177′, drifted on 5 amygda-s, or "floors," as they were termed formerly, by the old company. e management extended a crosscut, on the old Cliff fissure, southeast, iderable distance northwest, to the old works under the greenstone, ont 20 cupriferous amygdaloidal beds, several of which have given s, and seem worthy of further investigation, showing several bunches mp-rock, but the lodes prove, so far as opened, extremely bunchy, lar in values. In 1907 the Cliff mine did 1,046′ of drifting. Equip-o. 1 shaft includes a shaft-rockhouse.

ngs at the Cliff include a power-house, with duplex hoist, 5-drill air- and boilers, a smithy, changing-house, combination office and ware-rding-house and a number of dwellings. The Cliff mine is reached weenaw Central railway.

d waste-burrows of the Cliff, which are extensive, were [illegible] on

royalty, to Henry Warren, who built an 8-stamp gravity mill, but this did not result profitably. Expenses of the Cliff mine, 1907, were $57,214.53, charged directly to operating expenses of the Tamarack company.

The Tamarack has 2 stamp-mills, on Torch Lake, a little more than a mile south of the Calumet & Hecla mills, these having 5 compound heads and 2 simple heads, latter idle, the 5 compound heads being capable of caring for all rock crushed at present. The mills have a combined daily capacity of circa 3,500 tons of conglomerate rock. Stamp-heads are fitted with 8" mortar-grates, opening into ¼" mesh revolving screens, with Parnall-Krause hydraulic discharges. The stamps have Nordberg crushing rolls, to care for raggings from the mortars, these rolls having rigid journals, with independent wash for each set. Finisher jigs have been replaced by Wilfley tables.

No. 1 mill has 5 Allis heads, 3 of which are compounded, and this mill has a steel trestle approach. No. 1 boiler-house has four 200-h. p. Pratt boilers, operated at a steam pressure of 150 lbs. per square inch.

No. 2 mill has 2 steeple-compound Allis-Chalmers stamps, with a traveling crane, and No. 2 boiler-house has seven 200-h. p. boilers.

The joint pumphouse of the Tamarack and Osceola mines has two 40,000,000-gallon pumps and one 15,000,000-gallon pump. The two larger pumps, which are duplicates, have triple-expansion steam ends, with 22", 40" and 60" cylinders of 52" stroke, and the water end has three 30" plungers and a 42" discharge pipe. The foundation for the newest large pump is 27' deep, in solid sandstone.

The mills have a 30x90' machine-shop, of sand-lime brick, with steel roof, and there are a number of dwellings for employes at the millsite.

The Tamarack and Osceola mines have joint wharves, and steel coal-sheds with unloading apparatus, at Dollar Bay, on Portage Lake, these being among the most extensive in the district.

Tamarack mineral is smelted at Dollar Bay, by the Lake Superior Smelting Co., which is controlled by the Tamarack, Osceola and Isle Royale companies, under the same general management. All mineral is transported from mills to furnaces in hopper-cars, saving the former cost of barreling.

Production has been as follows: 657,920 tons of rock stamped, yielding 15,286,093 lbs. fine copper, with an average return of 23.2 lbs. per ton, in 1903; 642,320 tons rock stamped, yielding 14,961,885 lbs. fine copper, an average of 23.3 lbs. per ton, in 1904; 750,120 tons rock stamped, yielding 15,824,008 lbs. fine copper, an average of 21.1 lbs. per ton, in 1905; 389,680 tons rock stamped, yielding 9,832,644 lbs. fine copper, an average of 25.2 lbs. per ton, in 1906; 533,600 tons rock stamped, yielding 11,078,604 lbs. fine copper, an average of 20.8 lbs. per ton, in 1907. Production was circa 13,500,000 lbs. fine copper in 1908.

Gross costs of mining and stamping, per ton of rock, and cost of finished copper, per pound, have been as follows: $2.32 per ton and 11.5 cents per pound, in 1903; $2.42 per ton and 12.98 cents per pound, in 1904; $2.39 per ton and 13.37 cents per pound, in 1905; $3.62 per ton and 14.37 cents per pound, in 1906; $3.28 per ton and 15.82 cents per pound, in 1907. The mine made copper, 1901, for 9.1166 cents per pound, and in 1907 there was a falling off of 4.4 pounds fine copper per ton of rock stamped. The Tamarack always has been an expensive mine to work, and costs have increased, unavoidably, with depth, and the mine has suffered severely from fires. Under normal circumstances, the Tamarack is capable of earning small profits, and the management is to be commended for its vigorous efforts toward lessening costs, in all departments. The Cliff mine, while north of the proven zone of paying mines in Keweenaw county, is but a short distance from mines that are developing well, and is a property of considerable promise.

ICIÓN TAMBORAQUE. **PERÚ.**

orks office: Pacococha, Junín, Perú. Lizandro A. Proaño, owner and er. Property is a smelter, built circa 1906, having a 40-ton water-jacket urnace, 120 kilometers from Callao, at elevation of 9,820′. The Mina nia, having the same owner, has a 3′ to 6′ vein, carrying ore assaying 6% copper and 10 to 20 oz. silver per short ton.

O'SHANTER MINING CO., LTD. **IDAHO.**

fice: Spokane, Wash. Mine office: Osburn, Shoshone Co., Idaho. John urms, president; David C. Coates, secretary; Chas. Gammell, superintend Capitalization $1,000,000, shares $1 par. Lands, 7 claims, 1½ miles south burn, between the Chester and Vortex groups, in the Evolution district. rty has a vein of 5′ to 12′ width at surface, traceable circa 2,000′, carrying highly argentiferous gray copper, opened by an 80′ tunnel and a 50′ shaft, ng ore carrying silver, copper and lead values.

ANYIKA CONCESSIONS, LTD. **RHODESIA.**

ffice: 31 Clement's Lane, London, E. C., Eng. Mine office: Kansanshi, sia. Tyndale White, chairman; Robt. Williams, managing director; L. nd, secretary; John G. Watson, manager in Africa; Allan Gibb, general ger; Thos. Boyne and F. E. Stubt, assistant engineers; J. H. Hayden, manager; John R. Farrell, consulting engineer.

rganized Jan. 20, 1899, under laws of Great Britain, with capitalization 00, increased, later, to £1,000,000, shares £1 par. Debentures, £2,600,000 rized, par £8, at 5%; issued, £1,500,000. Property consists of a 45% share st in the Union Minière du Haut Katanga; a 65% interest in the Kansanshi balance being owned by British South African Co.; a 90% interest in enguella Railway Co., and a 40% interest in the Katanga Railway Co. principal operating company is the Union Minière du Haut Katanga, to the Tanganyika Concessions sold the Ruwe gold mine and the Busanga, aso and Chienzi tin mines.

ands originally were 2,000 square miles, north of the Kafue and Zambesi , in the Katanga district, near the Congo Free State boundary, also 2,000 for railroad and steamship terminals, at the southern end of Lake Tanika, and a 5-year concession, that expired 1905, to explore extensive areas e Congo Free State, and to work any discovered mine for 30 years, with n of extending the period of working to 99 years. In the Congo Free 72 large mining concessions were located, the company estimating that these claims show 15,000,000 long tons of 4% copper ore, most of which be extracted open-cast, and, on another group, the company estimates 000 tons of ore, of 13% copper tenor. The Congo Free State properties been disposed of to the Union Minière du Haut Katanga, in which the nyika company holds a large share interest. The company also has an st in various discoveries in Katanga, until 1911, and mineral prospecting expiring 1912, to circa 120,000 square miles in Angola. The properties Katanga district are in a rolling country, having a healthy climate for rial Africa, with good water and an abundance of wood. The diamond as been used extensively, proving large ore bodies, though some of the highly silicious, and apparently will require special treatment for eco- l reduction. Mr. Williams estimates the average ore tenor of all mines copper, with some mines carrying ores averaging up to 20% copper.

e principal copper mines of the company, in various stages of develop- are the Kansanshi, Kolwezi, Kambobe, Kabalela, Kakanda, Likasye, ume and Star of the Congo, principal development being on the Kan- mine.

Kansanshi mine lies at an elevation of about 5,000′, near the Congo-

Zambesi divide, 12 miles from the Congo Free State boundary, in north
Rhodesia. The Kansanshi is an old property, worked open-cast, by nati
centuries, the mine showing trenches and pits for a distance of circa
these varying in width from 1′ to 75′, and in length from 1,000′ to 1,20
an extreme depth of 50′, there being 6 principal lines of workings,
from 3′ to 30′ in width, from 5′ to 30′ in depth, and from 300′ to 1,300′

Country rock of the Kansanshi is sandstone, overlying limesto
schist, the sandstone being micaceous and fissile in places, elsewhere
clayey, through partial decomposition, the sandstone being more
charged with malachite, occurring as speiss, the upper portions carry
achite and chrysocolla, with occasional occurrences of azurite and me
and some cuprite, with silicious gangue, carrying considerable mangane
ide in the superficial portions. The ferruginous matter in the g
chiefly limonite, usually somewhat ochrous, but occasionally hard and
Surface ores are mainly malachite, said by Mr. Farrell to show no evi
having resulted from alteration of sulphides in place, the results lea
to the opinion that the malachite was deposited from hot solutions, co
fissures. The ore, as a whole, carries an excess of about 25% silica,
require heavy fluxing, for which purpose iron ore and limestone are
distant.

The Kansanshi mine has 5 shafts, sunk in old trenches, on ore bod
to 16′ width. The main shaft, of 300′ depth, is on "D" reef, of
average width, opened for a distance of circa 1,000′, on the 85′ level, o
massive, with copper impregnations in sandstone for 5′ to 10′ on eithe
the vein, ore being mainly malachite, with an average sampling o
copper and circa $2 gold per long ton. The deeper workings show a li
cocite and chalcopyrite, associated with limited quantities of pyrite,
base zone has not been reached, and the depth of the oxidized zone is
as yet. A second level has been opened in this shaft, at depth of
the Kansanshi mine, "E" reef, of 2′ to 3′ width, has been opened
500′ distance, on the 85′ level, and a new reef, of about 4′ width,
opened for nearly 500′ on the 85′ level.

The Kolwezi mine, opened by shaft, has been probed by diam
borings, showing a continuation of the copper beds to considerable d

The Kambobe No. 2 mine has 2 shafts, H and I, of about 100′ de
with crosscuts said to prove an ore body of nearly 200′ width.

The Fungurume mine has 4 short tunnels, one of which is said
penetrated 191′ of ore.

The Likasye mine, slightly developed by tunnel, apparently is id

The Star of the Congo mine is said to have ore of better aver
than the Kansanshi, and it was said, 1907, that developments had ex
tons of 8% ore, which, with assorting, would be self-fluxing.

There are small test smelters at the Kansanshi and Kolwezi min
having a small blast-furnace, and test smelting was begun, circa Janua
According to Mr. Williams, the company planned selection and dressin
so that only about 1 ton in 5 would be sent to the smelter, and it is
that the ore, as mined, requires concentration.

The Benguella railway, of 330 kilometers length, planned to be ab
miles long, when completed, running from Lobito Bay to a smelting
the Lualaba river that is centrally located as to the mines, had 100 mi
pleted and opened for traffic, early 1908. The railroad is planned
circa £4,000,000, complete.

Transportation between the principal mines and the terminus
Rhodesia railway is by 3 traction engines, and the company endeavore
to induce the Rhodesia railway to build a line to the Star of the Cong

ıd of to the Kansanshi mine, serving the latter with a branch line. The ıny hopes to secure railroad connections in 1909.

The Tanganyika Concessions, Ltd., modestly claims to possess the greatest r deposit in the world. This possibly is the case, but, while the deposits f much promise, their exact status remains to be proven by further devel- nt, and extensive smelting operations, and the properties, while of un- ted value, must be considered overestimated. Mr. Williams estimated, that with copper at £50 per long ton, the Katanga mines had $100,000,000 lues developed, and estimated the cost of production and delivery at £25 ong ton of finished copper, which figures are considered not only excessive tonnage, but much lower as to costs than are warranted. Mr. Farrell's nal estimate of costs was £12 per ton of finished copper, in Katanga, but estimate is considered entirely too low, and there is no likelihood that ompany can produce copper, in the interior of Africa, at any such ridicu- price, and if the company succeeds in making copper for three times the ıated cost of 2.6 cents per pound, it will be doing very much better than ıverage copper mine, and the profits will be ample. The Tanganyika Con- ons, Ltd., is considered a property of exceptional promise, but its manage- , while efficient, is entirely too much given to inflated estimates of ton- , and unduly depreciated estimates of probable costs.

PAÑIA MINERA TARAPACÁ DE COLLAHUASI. **CHILE.**

Office: Valparaiso, Chile. Mine office: Collahuasi, Tarapacá, Chile. Or- ted Jan. 10, 1906, under laws of Chile, with capitalization £50,000, shares ır.

TANA, LTD. **AUSTRALIA.**

Office: London Bank Chambers, Creek St., Brisbane, Queensland, Aus- ı. Mine office: Chillagoe, Queensland, Australia. H. M. Hicks, chair- G. S. Murphy, auditor; E. Austin Bell, secretary. Organized under laws ueensland, with capitalization £120,000, shares 5s. par. Lands, 230 acres, hold, on the Walsh river, circa 30 miles northwest of Chillagoe, showing deposits of auriferous and argentiferous copper oxides and carbonates. ıall parcel of hand-selected ore returned 15% copper. Idle several years.

MAN-COMSTOCK, CONSOLIDATED. **TASMANIA.**

Mine office: Queenstown, Montagu Co., Tasmania. P. Briggs, manager. s, on the western slope of Mount Lyell, have 3 tunnels, lowest showing en schist carrying copper ore of fair grade. In 1906 shipped 20 tons of ous ore to London, for special treatment. Employs 6 men.

MAN & CROWN LYELL EXTENDED MINING CORPORATION, N. L. **TASMANIA.**

Offices: 47 Queen St., Melbourne, Australia, and Palmerston House, Lon- E. C., Eng. Mine office: North Mount Lyell, Montagu Co., Tasmania. Agg Hills, chairman; C. Barclay Holland, London director; John Branden, ourne secretary; E. Habben, London secretary; Edw. Carter, mine man- Organized August, 1889, and reorganized Apr. 24, 1906, under laws of oria, with capitalization £150,000, shares £1 par.

Lands, 3 claims, area 181 acres, leasehold, in the North Mount Lyell dis- , opened by 3 tunnels, longest 400′ and 1,453′, showing sulphide ore occur- as impregnations in schist. An 8′ vein carrying a little native copper, eeded by copper sulphides, was discovered, 1908. Ores are chalcopyrite galena, said to give average assays of 7% copper and 15% lead. Employs en.

MANIA COPPER MINING & MILLING CO. **COLORADO.**

Office: 603 Provident Bldg., Philadelphia, Pa. Mine office: Winfield, fee Co., Colo. D. B. Dance, vice-president; G. Albert Smyth, secretary; O. McHenry, *treasurer.* *Organized Apr. 20,* 1898, under laws of Colorado,

with capitalization $1,000,000, shares $1 par. Lands, 13 claims, area
acres, in the La Plata district, with about one-half mile of undergrou
ings, estimated to show 750,000 tons of auriferous and argentiferou
sphalerite and chalcopyrite, which is too much. Has a 25-ton pyritic
Idle and presumably moribund.

TASMANIAN COPPER CO., LTD. TAS

Office: 348 Winchester House, London, E. C., Eng. Operating o
Patterson St., Launceston, Tasmania. Mine offices: Rosebery, Du
Tasmania, and Blinman, Flinders Co., South Australia. F. L. Cox, c
E. M. King, chairman local board; W. L. Hoyt, general manager; Jos.
wells, London secretary; A. Simon, local secretary; G. Barker, mine
Organized Jan. 13, 1897, with capitalization £325,000, shares £1 par.
tures, £12,500, at 10%, issued June, 1905, redeemable 1915, at par,
at 50% premium. Company offered £30,000 new debentures, late 19

Tasmanian lands are 386 acres, on Mount Black Bear, near the S
in the North Dundas district, including the Rosebery and Ring Riv
also a 5-acre smelter site, all in the West Coast district. The Rosel
has an ore body of 24′ estimated average width, traceable circa 3,
apparently is a replacement of country rock along a line of fault
having a schistose footwall, heavily impregnated with pyrite, and c
paystreak of 6″ to 5′ width for length of circa 500′, with ore assayi
copper and 1.75 oz. silver per long ton. The ore is a complex sulphid
ing auriferous chalcopyrite, sphalerite and galena, from which the zi
have been lost heretofore, no process in use having succeeded in reco
of the metallic values. The Rosebery mine is developed by tunnel
644′. Ore reserves were estimated by the company, 1905, at 158,400
and production, at last accounts, was circa 1,000 long tons monthly.
pany is said to plan a smelter at the Rosebery mine.

South Australian lands include the Blinman mine, and about
small mines and prospects, in the Blinman and Yudnamutana distri
including the Sliding Rock mine, area 78 acres, on the south side
Rock Creek, 14 miles from Beltana, and the Yudnamutana, Leigh
Warra Warra mines. The district is arid, and considerable trouble
enced, in the dry season, from inadequate water supply. The South
holdings also include 7 coal properties, area 10,000 acres, 40 miles
Blinman mine.

The Blinman mine, area 120 acres, with 320 acres of mineral
joining, is in the Flinders range, 272 miles north of Adelaide, and
1902. The Blinman mine, opened 1862 and reopened circa 1899,
bodies of irregular value in micaceous limestone, only the richer port
smelted, the bulk of ore produced requiring concentration. The mi
to have produced considerable ore of 8% average copper tenor, conce
about 23% for shipment to the smelters, in addition to which small
of hand-picked ore, of 30 to 40% copper tenor, have been shipped.
has a 450′ main shaft, and ore reserves were estimated, June, 1904,
tons. The Blinman has a smelter with a 150-ton blast-furnace, at Le
north of the mine, making matte of 50 to 55% copper tenor, when in

Production of the Blinman mine was 5,524 long tons of ore
337,075 lbs. fine copper, in 1904, and 898,240 lbs. fine copper during
half of 1907. Average return of ore smelted, first half of 1905, was ab
copper. The Blinman mine was closed down December, 1907, and
was said, 1908, to have definitely abandoned its properties in South

TASMANIAN METALS EXTRACTION CO. TAS

Works office: Rosebery, Montagu Co., Tasmania. A. J. Thynne,
Organized 1908, under laws of Great Britain, with capitalization

s £1 par. Company plans erecting an extensive custom smelting plant, of 400 tons daily capacity.

IAN LYELL COPPER CO., LTD. **TASMANIA.**

ead. Absorbed, March, 1903, by Lyell-Comstock Consolidated Copper Co., Formerly at North Mt. Lyell, Montagu Co., Tasmania. Described Vol. IV.

IAN LYELL PROSPECTING ASSOCIATION, N. L. **TASMANIA.**

ead. Formerly, circa 1891-1897, at North Mt. Lyell, Montagu Co., Tas-

RI MINE **JAPAN.**

ine office: Nosakagawa-mura, Yoshino-gori, Yamato, Japan. A very producer, making, circa 1901, about 40,000 lbs. fine copper yearly.

AYOCO LAKE COPPER CO. **BRITISH COLUMBIA.**

fice: care of C. R. Howard, secretary, Spokane, Wash. A. M. Riley, rer; A. H. Shepard, manager; Jos. B. Lindsley, attorney; preceding s and F. P. Greene, trustees. Organized circa 1907, with capitalization ,000, shares $1 par. Lands, 3 groups, area 300 acres, in the vicinity of oco Lake, in the Nanaimo district, circa 160 miles northwest of Van-, near the British Columbia border. One group is said to show a moun- f cupriferous pyrite, averaging 1% copper, with combined gold and silver of $1.50 per ton. Another group is said to have a vein 75' to 200' wide, ble 3,000', with a 20' paystreak, said to average 5% copper and $2 per combined gold and silver values, opened by a 110' tunnel. Property is aid to show ores of iron and antimony.

NTON-NEW BEDFORD COPPER CO. **MASSACHUSETTS.**

fice and works: New Bedford, Bristol Co., Mass. Henry M. Lovering, ent; Clarence A. Cook, vice-president and agent; Henry F. Bassett, rer. Is a consolidation of the Taunton Mfg. Co., New Bedford Copper d Revere Copper Co. Has extensive copper and brass rolling mills.

OR'S COPPER, LTD. **UTAH.**

fice: 221 Herald Bldg., Salt Lake City, Utah. Mine office: Moab, Co., Utah. W. D. Bohm, manager; preceding officer, W. B. Taylor, J. R. Edmund M. Slatter and C. P. Drennen, directors. Organized Nov. 20, under laws of Montana, with capitalization $2,500,000, shares $5 par. rty is the Big Indian mine.

OR COPPER MINES CO., LTD. **ONTARIO.**

fice: care of Robt. H. Taylor, president, Sault Ste. Marie, Mich. H. P. , secretary. Property is in Algoma, Ontario, east of Sault Ste. Marie. ded about $30,000 in exploratory work. Idle since circa 1903.

LOTE COPPER CO. **NEW MEXICO.**

ead. Succeeded by Las Vegas Copper Co. Formerly at Las Vegas, San l Co., N. M.

MSEH COPPER CO. **MICHIGAN.**

fice: 12 Ashburton Place, Boston, Mass. Mine office: Calumet, Hough- o., Mich. Employs circa 60 men. A. Agassiz, president; Col. T. L. Liver- vice-president; Geo. A. Flagg, secretary and treasurer; Jas. MacNaugh- anager. Organized Feb. 3, 1880, under laws of Michigan, with capital- n $2,500,000, shares $25 par; issued, $1,373,975. Is controlled, through rship of 54,249 share of the outstanding stock issue of 54,959 shares, by alle Copper Co. Ended fiscal year Apr. 30, 1908, with a debit balance 28,953.

ands, 560 acres, in a very irregular tract lying next south of the Osceola carrying circa 400 acres of the underlay of the Kearsarge amygdaloidal Work was done first on the Calumet conglomerate, where a shaft of about depth found no payable copper. A shaft of circa 2,300' depth, on the la amygdaloid, begun 1899, *was abandoned* November, 1902, being found

practically barren of copper, but recent developments to the northwar depth, in No. 6 shaft of the Osceola mine, indicate the possibility of ground on the Osceola bed, at greater depth than yet reached in the Tecu shaft.

The Tecumseh carries about 1,800' of the strike of the Kearsarge lode has 2 shafts thereon.

No. 1 shaft, of 3 compartments, 6x18' in size, sunk diagonally on the of the lode, was circa 1,400' deep, early 1908, showing a bed of about 15' age width, giving a promising showing of copper. Equipment inclu hoist good for 2,000' depth, raising 3-ton skips, and a 15-drill air-compr

No. 2 shaft, 1,000' north of No. 1, was started Aug. 30, 1905, and was deepened, 1907.

Production, under a former management, was begun circa Nov. 1, at the rate of about 100 tons of rock daily, but was soon discontinued. duction, for year ending Apr. 30, 1908, was 59,875 lbs. fine copper, s from rock mined previous to 1907.

TEHAMA MINING CO. CALIFO

Dead. Formerly at Ingot, Shasta Co., Cal. Described Vol. VI.

TELEMARKEN COPPER MINING & SMELTING CO., LTD. NOR

Office: 43 Finsbury House, Blomfield St., London, E. C., Eng. Mine Mo, Bratsberg Amt, Norway. Chas. McCully, general director; H McCully, manager; J. S. Sargent, secretary. Organized May 21, 1906, laws of Great Britain, with capitalization £100,000, shares £1 par; Issued. Debentures, £2,000, at 6%. Paid a dividend of 7½%, March 15

TELESPORO COPPER CO., LTD. S

Dead. Name changed, June, 1907, to General Company of Spanish Ltd. Formerly at Cortegana, Huelva, Spain.

TELKWA MINES, LTD. BRITISH COLU

Mine office: Aldermere, Skeena division, Cassiar district, B. C. include the Duchess and Countess claims, carrying apparently parallel of argentiferous copper ore, with values mainly in silver. Devel on the Duchess claim includes a 60' tunnel and several open-cuts, sho of vein of copper ore.

TELKWA MINING, MILLING & DEVELOPMENT CO. BRITISH COLU

Mine office: Aldermere, Skeena division, Cassiar district, B. C. ... on the body of circa 50' width, carrying a hanging-wall payst chalcopyrite and specular iron ore, with a 150' open-cut, on the A claim, showing copper carbonates, pyrite and hematite.

TELLURIK MINING & MILLING CO. COLO

Mine office: Idaho Springs, Clear Creek Co., Colo. Ores carry gold and copper. Presumably idle.

TEMAGAMI COPPER CO ON

Office: Toronto, Ont. Mine office: Temagami, Nipissing, Ont. O ... lands of Ontario, with capitalization $2,000,000. Is said ... diamond drill core of good ore.

TEMPEST MINING & SMELTING CO. OR

Dead. Formerly at Alamo, Umatilla Co., Ore.

TEMPLEMAN, LTD.

Dead. Formerly liquidated, July, 1902. Formerly at Antofagast

TENABO-MOHICAN MINES CO. NE

Mine office: Trouble, Lander Co., Nev. H. L. Sanborn, secreta ... Lands, 320 acres, developed by a shaft showing argentiferous

w average tenor. Equipment includes a steam plant with hoist and essor.

FOOT MINING CO. **WYOMING.**

. Formerly at Douglas, Converse Co., Wyo. Described Vol. VII.

KES MINING CO. **CALIFORNIA.**

office: Edgewood, Siskiyou Co., Cal. Lands, 10 claims, circa 9 miles dgewood, on Mount Eddy, showing 2 parallel fissure veins, in gabbro, y 2 transverse veins, opened by tunnel and a 12′ pit, latter showing s and argentiferous chalcopyrite, assaying 11 to 30% copper, 2.5 to ver and $5 to $28 gold per ton.

SEE COPPER CO. **TENNESSEE.**

:: 334-11 Broadway, New York, N. Y. Mine office: Copper Hill, Tenn. Employs 1,200 men. J. Parke Channing, president; Fredk. , vice-president; E. C. Westervelt, secretary; Julius H. Susmann, ; preceding officers, Henry H. Rogers, Albert Lewisohn, Walter Lewalter S. Henry and Jas. Philips, Jr., directors; B. Britton Gottsberger, nanager; N. H. Emmons, assistant general manager; Walter L. Steeral superintendent; John Edwards, mine superintendent.

nized Apr. 26, 1899, under laws of New Jersey, with capitalization), shares $25 par. Debentures outstanding, Dec. 31, 1907, $100,000, first-mortgage 20-year bonds at 5%, dated July 1, 1902. National ık, New York, and Old Colony Trust Co., Boston, transfer agents. mpany of America, New York, and State Street Trust Co., Boston, . Shares are listed on the Boston Stock Exchange. Annual meeting, sday in February.

profits and dividends have been as follows: $417,565 profits and dividends, in 1903; $186,966 profits and $218,750 dividends, in 1904; profits and $218,750 dividends, in 1905; $824,231 profits and $250,000 , in 1906; $800,634 profits and $650,000 dividends, in 1907; $500,000 in 1908, giving total dividends, to Dec. 31, 1908, of $2,025,000. 907 the company expended $728,067.11 for construction account, of 04,525 was for the acid plant, and $114,000 for improvements at the

s, 2,080 acres, with 11,000 acres miscellaneous lands, in the Ducktown Ore was first discovered, and mining begun, circa 1850, and the mines rated regularly, previous to the American Civil War, which caused pension. Lands include the Burra Burra, London, Polk County and e mines, latter idle; also the Eureka iron mine, operated, under lease, irginia Iron, Coal & Coke Co., which, 1907, extracted 39,498 long tons re.

erty shows pre-Cambrian metamorphosed mica-schist, carrying 6 series ılar ore bodies, of which 3, under development, show extensive gossans, having a little oxidized ore near surface, which was mined out,). The lenses range 30′ to 70′ in width, and 500′ to 2,000′ in length, average depth of 400′, carrying chalcopyrite, associated with pyrite, gangue, ore ranging in tenor from 2 to 4% copper, circa 40% iron, hur and 15% silica, with very small quantities of gold and silver. As other refractory elements are lacking, the ore is excellently adapted and close concentration, and also smelts well, giving very clean slags. mines are extensively developed, there having been made 2,026′ of ings and 15,050′ of diamond drill borings, in 1907, giving ore reserves l at 2,292,369 tons, with probable additional ore to the extent of tons, giving total probable reserves of 3,322,369 short tons, Jan.

rincipal property is the Burra Burra mine, yielding about 60% of the

with practically every corporation in the United States. Net
$914,013 in 1904, and are said to have exceeded $1,000,000 in

lude La Aurora mine, area circa 4,500 acres, 10 miles from
about 130 miles east of the City of Mexico, with a 16-acre
d about 2,500 acres miscellaneous lands, also Los Ocotes group,
s. The climate is equable, and mines are surrounded by fine
ith a labor supply that is adequate and of good character.
mine, opened mainly by tunnels, has developed a considerable
rous and argentiferous chalcopyrite, associated with sphalerite,
assays of circa 8% copper, up to 200 grams silver and 5 grams
ton, with circa 15% iron, 20% sulphur, 10% calcium carbonate

group, area 240 hectares, was bought October, 1905, of Com-
de Cobre Los Ocotes, S. A. This property, 2½ miles north of
utla, Oaxaca, Mex., is a group of mines, including the San Juan,
the few copper properties that has paid for development, from
ce inception, and, in addition, has given a profit, the mine
steady producer since 1900. Lands show 4 fissure veins, of
the San Juan mine, is of 2′ to 8′ width, in porphyry, developed
and 500′ length, with 3 shafts, 2 of 100′ each and one of 230′,
0′ of workings, estimated to place 40,000 tons of ore in sight.
is sulphide, gives average assays of 6.5% copper and 15 oz.
ic ton, with a trace of gold, and ore, as produced, has averaged
a 11% copper, with good silver values, and considerable ore has
averaging returns of 20% copper and 40 oz. silver per metric ton.
at Los Ocotes group includes a plant with steam, gas and
, steam hoists, steam pumps and power drills. In 1904 Los
d 290 tons of concentrates, yielding 121,000 lbs. fine copper and
r.
any has a 10-mile electric railroad, from the Aurora mine to
re connection is had with the Interoceanic Railway of Mexico.
e is connected with the smelter by an aërial tram of 250 tons

r, near the Aurora mine, includes an old plant, with 3 blast-
out 300 tons daily capacity. There also is a new plant, with
last furnaces, and a converter department with 3 stands, mak-
ars averaging 98.6% in copper tenor.
p. plant at the smelter includes a 1,000-h. p. hydro-electric in-
which water is brought by a 3,600′ flume, under a 900′ head,
ic river, the company having a government concession for the
ers of water per second from that stream. Electric power is
ilometers to the mine, from the plant at the smelter.
1905, was 7,512,252 lbs. fine copper, 286,012 oz. silver and
The property was closed down, Nov. 23, 1907, but development
inued, and the new smelter completed and production sup-
umed, late 1908. The Teziutlán is the most successful and
mine in southern Mexico, and has a good management.

OLIDATED COPPER MINES, N. L. **TASMANIA.**

erly, circa 1893, at North Mt. Lyell, Montagu Co., Tasmania.

HUR & COPPER CO., LTD. **SPAIN.**

West George St., Glasgow, Scotland. Works offices: Oldbury,
Eng., Wellington Quay, Northumberland, Eng., Hebburn-on-
g., and Cardiff, Glamorganshire, Wales. Mine office: Alosno,
King, chairman; preceding officer, Jas. Cooper, Louis Oscar

TETON COPPER MINING & SMELTING CO. WY

Dead. Formerly at Jackson, Uinta Co., Wyo.

TEXADA CONSOLIDATED MINING CO. BRITISH COL

Office: Seattle, Wash. Mine office: Van Anda, Texada Islan G. L. Tanzer, president; D. Pabst, vice-president; M. Nally, secretary include the Cornell mine, and 8 adjacent claims, known as the Rave The Cornell mine was opened by a glory-hole, which has caved in, an main shaft, showing bornite and chalcopyrite carrying up to 8% co oz. silver and $1 gold per ton. Has a steam plant with hoist and 5-dr air-compressor.

TEXADA COPPER MINING CO. BRITISH COL

Dead. Formerly at Van Anda, Texada Island, B. C. Fully describe

TEXAS CONSOLIDATED MINES & POWER CO. CALIF

Dead. Property sold, circa 1904, to W. H. Garlick. Formerly at Shasta Co., Cal.

TEXAS COPPER CO. AR

Mine office: Tucson, Pima Co., Ariz. Chas. F. Hoff, president a ager. Capitalization $3,000,000, shares $1 par. Lands, 3 claims, unp area 60 acres, one-half mile north of the Gould mine, in the Amole 20 miles northwest of Tucson. Mine has a 35' shaft and a 140' tunne ing a strong iron gossan with copper stains.

TEXAS COPPER CO.

Dead. Formerly had an office at Gowanda, N. Y.

TEZEPACO COPPER MINING CO. M

Mine office: Rosario de Tesopaco, Alamos, Sonora, Mex. W. W. superintendent. Organized 1907, under laws of Colorado, with capit $1,000,000, by Ernest Pratt, Will E. Ewen and Luther A. Hyde. veloping, 1907, and planned shipping ore to National Metal Co., He

TEZIUTLÁN COPPER CO. M

Office: 82 Beaver St., New York, N. Y. Mine office: La Aur Teziutlán, Puebla, Mex. Organized under laws of New Jersey, with zation $1,000,000, shares $100 par. Is controlled, through ownership o stock issue, by Teziutlán Copper Mining & Smelting Co.

TEZIUTLÁN COPPER MINING & SMELTING CO. M

Office: 82 Beaver St., New York, N. Y. Mine offices, La Aur Teziutlán, Puebla, Mex., and Ejutla, Oaxaca, Mex. Geo. D. Barron, pr Robt. S. Towne, vice-president and treasurer; S. W. Reynolds, secon president; preceding officers, A. Foster Higgins, W. J. Best, E. W. Gou Henry L. Nelson, Henry Shepard and R. M. Carter, directors; Robt. L. general manager; R. E. Safford, assistant treasurer and treasurer; A. superintendent; A. F. Schneider, mill superintendent; F. A. Barron, m gist; E. DuB. Lukis, engineer.

Organized April, 1905, under laws of New Jersey, with capital $10,000,000, shares $100 par. Controls, through entire stock ownersh Teziutlán Copper Co., and has a close working arrangement with the Co Minera Mexicano. State Street Trust Co., Boston, transfer agent. meeting, first Thursday in June.

Dividends are at the regular rate of 6% per annum, with extras, 19 making the rate 8% per annum. Dividends have been as follows: in 1903; $350,000 in 1904; $495,216 in 1905; $800,000 in 1906; $80 1907. The company, having sufficient funds on hand, anticipated the and extra dividends for January, 1908, distributing the regular qu dividend of $1.50, and 50 cents extra, on Nov. 10, 1907, though crediting 1908 account, the disbursement being made at a time when dividends

emium, with practically every corporation in the United States. Net s were $914,013 in 1904, and are said to have exceeded $1,000,000 in

nds include La Aurora mine, area circa 4,500 acres, 10 miles from án, and about 130 miles east of the City of Mexico, with a 16-acre site, and about 2,500 acres miscellaneous lands, also Los Ocotes group, hectares. The climate is equable, and mines are surrounded by fine lands, with a labor supply that is adequate and of good character.

Aurora mine, opened mainly by tunnels, has developed a considerable of auriferous and argentiferous chalcopyrite, associated with sphalerite, average assays of circa 8% copper, up to 200 grams silver and 5 grams er metric ton, with circa 15% iron, 20% sulphur, 10% calcium carbonate % silica.

os Ocotes group, area 240 hectares, was bought October, 1905, of Com- Minera de Cobre Los Ocotes, S. A. This property, 2½ miles north of artín, Ejutla, Oaxaca, Mex., is a group of mines, including the San Juan, is one of the few copper properties that has paid for development, from tion, since inception, and, in addition, has given a profit, the mine been a steady producer since 1900. Lands show 4 fissure veins, of one, on the San Juan mine, is of 2′ to 8′ width, in porphyry, developed ′ depth and 500′ length, with 3 shafts, 2 of 100′ each and one of 230′, irca 4,000′ of workings, estimated to place 40,000 tons of ore in sight. re, which is sulphide, gives average assays of 6.5% copper and 15 oz. per metric ton, with a trace of gold, and ore, as produced, has averaged s of circa 11% copper, with good silver values, and considerable ore has roduced averaging returns of 20% copper and 40 oz. silver per metric ton. quipment at Los Ocotes group includes a plant with steam, gas and power, steam hoists, steam pumps and power drills. In 1904 Los produced 290 tons of concentrates, yielding 121,000 lbs. fine copper and oz. silver.

ne company has a 10-mile electric railroad, from the Aurora mine to lán, where connection is had with the Interoceanic Railway of Mexico. rora mine is connected with the smelter by an aërial tram of 250 tons capacity.

he smelter, near the Aurora mine, includes an old plant, with 3 blast- es, of about 300 tons daily capacity. There also is a new plant, with 250-ton blast furnaces, and a converter department with 3 stands, mak- nverter bars averaging 98.6% in copper tenor.

2,000-h. p. plant at the smelter includes a 1,000-h. p. hydro-electric in- ion, for which water is brought by a 3,600′ flume, under a 900′ head, the Totoyic river, the company having a government concession for the 2,500 liters of water per second from that stream. Electric power is itted 6 kilometers to the mine, from the plant at the smelter.

oduction, 1905, was 7,512,252 lbs. fine copper, 286,012 oz. silver and z. gold. The property was closed down, Nov. 23, 1907, but development was continued, and the new smelter completed and production sup- was resumed, late 1908. The Teziutlán is the most successful and ng copper mine in southern Mexico, and has a good management.

SIS CONSOLIDATED COPPER MINES, N. L. **TASMANIA.**

ad. Formerly, circa 1893, at North Mt. Lyell, Montagu Co., Tasmania.

SIS SULPHUR & COPPER CO., LTD. **SPAIN.**

ice: 126 West George St., Glasgow, Scotland. Works offices: Oldbury, tershire, Eng., Wellington Quay, Northumberland, Eng., Hebburn-on- Durham, Eng., and Cardiff, Glamorganshire, Wales. Mine office: Alosno, , *Spain. Jas. King, chairman; preceding* officer, Jas. Cooper, Louis Ose

TETON COPPER MINING & SMELTING

Dead. Formerly at Jackson, Uinta Co.

TEXADA CONSOLIDATED MINING CO.

Office: Seattle, Wash. Mine office: G. L. Tanzer, president; D. Pabst, vice-pres include the Cornell mine, and 8 adjacent c The Cornell mine was opened by a glory-ho main shaft, showing bornite and chalcopyr oz. silver and $1 gold per ton. Has a steam air-compressor.

TEXADA COPPER MINING CO.

Dead. Formerly at Van Anda, Texada Is

TEXAS CONSOLIDATED MINES & POWE

Dead. Property sold, circa 1904, to W. Shasta Co., Cal.

TEXAS COPPER CO.

Mine office: Tucson, Pima Co., Ariz. ager. Capitalization $3,000,000, shares $1 area 60 acres, one-half mile north of the 20 miles northwest of Tucson. Mine has a ing a strong iron gossan with copper stains

TEXAS COPPER CO.

Dead. Formerly had an office at Gowa

TEZEPACO COPPER MINING CO.

Mine office: Rosario de Tesopaco, Ala superintendent. Organized 1907, under law $1,000,000, by Ernest Pratt, Will E. Ewe veloping, 1907, and planned shipping ore t

TEZIUTLÁN COPPER CO.

Office: 82 Beaver St., New York, N. Teziutlán, Puebla, Mex. Organized under zation $1,000,000, shares $100 par. Is cont stock issue, by Teziutlán Copper Mining &

TEZIUTLÁN COPPER MINING & SMELT

Office: 82 Beaver St., New York, N. Teziutlán, Puebla, Mex., and Ejutla, Oaxaca Robt. S. Towne, vice-president and treasu president; preceding officers, A. Foster Hig Henry L. Nelson, Henry Shepard and R. M. general manager; R. E. Safford, assistant t superintendent; A. F. Schneider, mill super gist; E. DuB. Lukis, engineer.

Organized April, 1905, under laws of $10,000,000, shares $100 par. Controls, th Teziutlán Copper Co., and has a close worki Minera Mexicano. State Street Trust Co., meeting, first Thursday in June.

Dividends are at the regular rate of 6% making the rate 8% per annum. Dividend in 1903; $350,000 in 1904; $495,216 in 19 1907. The company, having sufficient funds and extra dividends for January, 1908, d dividend of $1.50, and 50 cents extra, on No 1908 account, the disbursement being mad

ium, with practically every corporation in the United States. Net ere $914,013 in 1904, and are said to have exceeded $1,000,000 in

include La Aurora mine, area circa 4,500 acres, 10 miles from and about 130 miles east of the City of Mexico, with a 16-acre , and about 2,500 acres miscellaneous lands, also Los Ocotes group, ctares. The climate is equable, and mines are surrounded by fine ds, with a labor supply that is adequate and of good character.

urora mine, opened mainly by tunnels, has developed a considerable uriferous and argentiferous chalcopyrite, associated with sphalerite, rage assays of circa 8% copper, up to 200 grams silver and 5 grams etric ton, with circa 15% iron, 20% sulphur, 10% calcium carbonate ilica.

cotes group, area 240 hectares, was bought October, 1905, of Com- era de Cobre Los Ocotes, S. A. This property, 2½ miles north of , Ejutla, Oaxaca, Mex., is a group of mines, including the San Juan, ne of the few copper properties that has paid for development, from , since inception, and, in addition, has given a profit, the mine en a steady producer since 1900. Lands show 4 fissure veins, of , on the San Juan mine, is of 2′ to 8′ width, in porphyry, developed pth and 500′ length, with 3 shafts, 2 of 100′ each and one of 230′, 4,000′ of workings, estimated to place 40,000 tons of ore in sight. which is sulphide, gives average assays of 6.5% copper and 15 oz. metric ton, with a trace of gold, and ore, as produced, has averaged circa 11% copper, with good silver values, and considerable ore has ced averaging returns of 20% copper and 40 oz. silver per metric ton. ment at Los Ocotes group includes a plant with steam, gas and ower, steam hoists, steam pumps and power drills. In 1904 Los duced 290 tons of concentrates, yielding 121,000 lbs. fine copper and silver.

ompany has a 10-mile electric railroad, from the Aurora mine to where connection is had with the Interoceanic Railway of Mexico. mine is connected with the smelter by an aërial tram of 250 tons city.

melter, near the Aurora mine, includes an old plant, with 3 blast- of about 300 tons daily capacity. There also is a new plant, with ton blast furnaces, and a converter department with 3 stands, mak- rter bars averaging 98.6% in copper tenor.

00-h. p. plant at the smelter includes a 1,000-h. p. hydro-electric in- for which water is brought by a 3,600′ flume, under a 900′ head, Totoyic river, the company having a government concession for the 00 liters of water per second from that stream. Electric power is d 6 kilometers to the mine, from the plant at the smelter.

ction, 1905, was 7,512,252 lbs. fine copper, 286,012 oz. silver and old. The property was closed down, Nov. 23, 1907, but development continued, and the new smelter completed and production sup- as resumed, late 1908. The Teziutlán is the most successful and copper mine in southern Mexico, and has a good management.

CONSOLIDATED COPPER MINES, N. L. **TASMANIA.**

Formerly, circa 1893, at North Mt. Lyell, Montagu Co., Tasmania.

SULPHUR & COPPER CO., LTD. **SPAIN.**

126 West George St., Glasgow, Scotland. Works offices: Oldbury, shire, Eng., Wellington Quay, Northumberland, Eng., Hebburn-on- ham, Eng., and Cardiff, Glamorganshire, Wales. Mine office: Alosno, ain. *Jas. King, chairman; pres* ficer, Jas. Cooper, Louis Oscar

Schmidt, A. J. Messeán, H. Gaskell, E. M. Chelvet, R. Millet, T. A
Hugh Brown and Sir Edw. P. Tennant, Bart., M. P., directors; G
secretary; Wm. P. Rutherford, general manager; Geo. Gray, superi

Organized Oct. 27, 1886, under laws of Great Britain, with capit
£1,250,000, shares £2 par. Dividends have been as follows: 17½% y
1904 and 1905; 25% in 1906; 20% in 1907. To end of 1907 th
dividends aggregated 795¾% on the share capital, amounting to the
cent total of £8,852,182, in addition to which the company had writte
sum of £2,416,065, and held the large reserve of £1,138,244, in cash and
ally choice securities. The company's dividends have averaged near
per annum, since 1868, without the lapse of a year in disbursements,
dend record comparable, among copper mines, only with that of the
of Michigan. Net profits, after all deductions, have been as follows: £
in 1903; £215,593 in 1904; £225,135 in 1905; £315,147 in 1906; £216,023

Lands include the Tharsis group, area 1,143 hectares, and the La
group, area 271 hectares, at Alosno, about 30 miles west of the Rio Ti
the Calañas or Zarza group, area 618 hectares, at Calañas, midway betw
Tharsis and Rio Tinto mines. The mines at Alosno, worked by the M
and probably by their predecessors as well, are identified, by some, w
Tarsish of the Bible. General geological conditions are much the sam
the Rio Tinto, the mines being in the southern zone of the Andevallo or
Morena district of Huelva. The property shows 4 main lenses, these
their axes of length southeast by northwest. The largest lense is the C
del Sur, to the south. The Filon del Norte, to the northeast, is ab
meters long and 140 meters in extreme width. The smaller lenses
Criadero de la Sierra Buillones, and the Filon del Medio, to the nor
The Tharsis and Lagunazo have been the principal producers in the p
are nearing exhaustion. The Calañas is developing fairly, and has a
years ore reserves developed. The company also is developing the Alo
Triunfo and Vulcano mines, at Alosno.

The ores of the Tharsis average about 3% copper, 50% sulphur a
iron, with very small quantities of gold, silver, lead, zinc, nickel, b
antimony and arsenic. Ore, after extraction, is piled in heaps and we
this process being assisted by occasional sprinkling. The leach-wat
into creosoted timber sluices, where the copper in solution is depo
pig iron, and precipitate prepared for smelting in the usual manner.

The work of stripping the overburden from the eastern extensio
Sierra Buillones mine is progressing satisfactorily, stripping having a
to 83,374 cubic meters in 1907. Removal of the overburden from the
mines was 145,580 cubic meters in 1906, and 128,266 cubic meters in 1
the Lagunazo mine, operations have been confined, for several years, t
ing tereros.

The company owns a private railway, leading from the mines to
where there is a shipping pier. The line is well supplied with rollin
frequent renewals keeping the equipment modern and efficient.

Owing to the gradual exhaustion of its principal Spanish ore bo
company has been endeavoring, for some years past, to secure new
and, to that end, has investigated properties in Norway, Italy, Cyprus
Mexico, Canada, Tennessee and Arizona. Two contiguous properties,
zona, were under investigation during 1908, and the company is in the
for a mine of cupriferous pyrites, rich in sulphur, with large bodies
and would give consideration to a promising copper property, regar
sulphur values.

The company owns extensive works at various points, including
process plant at Hebburn-on-Tyne, and an electrolytic refinery at Ol

Birmingham, with other works at Wellington-on-Tyne, Cardiff, Wales, ad, a suburb of Glasgow, Scotland.
etion of fine copper was 11,147 long tons in 1898; 5,620 long tons 2,590,226 lbs. in 1905; 10,617,600 lbs. in 1906 and 9,878,400 lbs. in duction for 1907 included 81,034 long tons of ore from the Sierra and 376,658 tons from the Calañas, an increase of 34,310 tons for with the total ore extraction of 457,692 tons, an increase of 19,935 the first increase in ore production for some years, with a decrease ng tons in output of finished copper. Production, 1907, included tons of regulus, and ore shipments, including washed sulphur ore, long tons. The record of this property is one of the best ever made pper mine.

ON-LEHMER MINING CO. **MEXICO.**
returned unclaimed from former office, Omaha, Neb. Mine office: axaca, Mex. Guillermo W. Thompson, general manager. The prop- cotlán has auriferous and argentiferous copper and lead ores, with electric power, employing circa 50 men, at one time. Company also have lands in the Tlacolula, Villa Alta and Ixtlán districts of ith aggregate holdings of circa 1,000 hectares.

ON RIVER COPPER & PLATINUM SYNDICATE. **AUSTRALIA.**
office: Walhalla, Gippsland, Victoria, Australia. Peter Finlayson, Organized circa 1907. The mine, having a 140' shaft, is claimed to need 1,000 tons of copper ore in the past, being one of the very few nes of Victoria.

ON SIDING COPPER & GOLD MINES, LTD. **BRITISH COLUMBIA.**
Was dissolved August, 1904. Formerly in British Columbia.

COPPER MINING & REDUCTION CO. **NEVADA.**
returned unclaimed from former office, 405 Empire Bldg., Denver, ne office: Hawthorne, Esmeralda Co., Nev. B. E. Young, superin- Is a twin of the Walker Lake Copper Mining & Smelting Co. ca 8 claims, 4½ miles east of Walker Lake. Is not regarded favor- and apparently moribund.

EARS MINING CO. **NEW MEXICO.**
Lands sold, circa 1905, to Southwest Smelting & Refining Co. For- Jarilla, Otero Co., N. M. Fully described Vol. V.

RIPPLES MINING CO. **WYOMING.**
and mine: Esterbrook, Albany Co., Wyo. Lands, immediately he Maggie Murphy, have an 85' shaft, showing mainly gold values.

AYS COPPER CO. **BRITISH COLUMBIA.**
Formerly at Alberni, Vancouver Island, B. C.

IAN MINING CO. **ALASKA.**
office: Landlock, Prince William Sound, Alaska. W. A. Dickey, Lands, near tidewater, are said to show an 8' vein of massive te, which probably is an exaggeration.

BUTTE MINING & MILLING CO. **ARIZONA.**
office: Prescott, Yavapai Co., Ariz. Lands, 8 miles west of Prescott, l by tunnel.

BUTTES MINING CO. **ARIZONA.**
Yuma, Ariz. Mine office: Dome, Yuma Co., Ariz. Porter Moffett, preceding officer, Perry O. Spittler, A. R. Mink and J. L. Lee. Organized circa July, 1907, with capitalization $1,500,000. Lands,) acres, showing ore, including some chalcocite, giving good assays silver and gold. Company was said, September, 1907, to have s of ore on the dump, which seems questionable.

VEREINIGTE THÜRINGISCHE KUPFERBE GEWERKSCHAFT.

Mine office: Gotha, Saxe-Coburg-Gotha, ager, at last accounts. Property is the Carl Bernhard and Wilhelm Ernst mines.

ASOCIACIÓN DE PROPRIETARIOS DE LA DEL TIBIDABO.

Office: Moncada 31, Barcelona, Spain. Spain. Property is the San Gervasio de Cass Idle some years.

TICON MINE.

Office and mine: care of Jas. A. Murray Mont. Property, lying between the Bell mine lator mine of the North Butte, has a 500′ inc level opened, at depth of 300′, and is said to sh which seems somewhat doubtful. Operations v

TILT COVE COPPER CO., LTD.

Office: 9 Queen St. Place, London, E. C Newfoundland. Col. J. W. Young, chairman; Taylor & Sons, managers; F. J. Williams, sup 1888, under laws of Great Britain, with capita issued, £178,000. Debentures, £80,000 first-mo year 1907 the Tilt Cove mine earned profits tween the Tilt Cove and Cape copper compan 1906, of £99,340, similarly divided. Company of £25,587 13s. 9d. Dividends were 13¾% in in 1907.

Lands, freehold, known as the Tilt Cove m northern shore of Newfoundland, are leased fo annual rental of £4,400, plus one-half the net Ltd., lease being terminable on one year's no includes 3 mines, known as the West, Bluff an been worked since circa 1870.

The East mine produces sulphide ores av small gold and silver values, the pyritic ore 1896, about 3.7% copper. The West mine has high grade, averaging about 11% copper. Or mated at 125,000 long tons, and yearly product of ore. For 1905 ore was mined at an average and mining costs, 1907, from the open pit of long ton. Production was 6,122,000 lbs. fine c in 1905.

TIMBER PEAK MINING CO.

Mine office: Socorro, Socorro Co., N. M copper. Has a concentrator. Long idle and ap

TINGHA MINE.

Office: Mereweather, N. S. W., Australia. Australia. Jas. McAlister, secretary; Capt. miles east of Tingha, show a 3′ vein, original depth by copper, carrying a 3″ paystreak as balance of ore body said to assay circa 15% c

TINTIC COMPANY.

Office: Salt Lake City, Utah. Mine offic Co., Utah. Grant B. Schley, president; Ken Michael Gavin, secretary and treasurer; prece

ti, directors. Organized, 1903, under laws of Maine, with capitaliza-
0,000, shares $5 par, increased, 1906, to $4,000,000. Is the parent
of the Tintic Mining & Development Co., Yampa Smelting Co., and
ntain Tramway Co., and is a securities-holding corporation only.

INING & DEVELOPMENT CO. **UTAH.**

: 213 Dooley Blk., Salt Lake City, Utah. Mine office: Bingham
alt Lake Co., Utah. Capt. Henry Stern, president; Chas. W. Sax-
ral manager; J. C. Dick, general superintendent; N. Treloar, mine
dent; E. E. Price, mine foreman. Organized, 1896, with capitaliza-
0,000, and reorganized January, 1906, under laws of Maine, with
ion $3,500,000, shares $5 par. Is controlled, through stock ownership,
ntic Co., and is operated as a close corporation, making no public

include claims in the Tintic district, now idle, on which heavy ex-
gave indifferent results, and the Yampa group, area circa 180 acres,
ork, Bingham Canyon, near the Utah Consolidated and Boston Con-
which shows a vein of 10′ to 200′ width, with average width of circa
ng disseminated chalcocite, covellite and chalcopyrite, formerly esti-
average 3.5% copper and $2 to $5 combined gold and silver values
ut now said to average 1 to 3% copper, 2 oz. silver and $1.50 gold
Ores are highly ferruginous, rendering them valuable for fluxing the
cious ores of the Bingham district.

opment is almost exclusively on the Yampa mine, a fractional claim
an 6 acres area, entirely surrounded by the Utah Consolidated. The
several miles of workings, and is developed by 2 tunnels and a 1,700′
ie Craig haulage tunnel, on the 1,200′ level, is 3,248′ long, intercept-
ain vein at about 2,200′ from the portal, and connecting with the
,448′. There are 12 levels, of which 8 are producing ore, above the
nnel, and the blind shaft on the 1,200′ level connects with the Craig
The Upper, or Yampa tunnel, intersects the shaft at 475′ and runs
)0′ on the vein, ore from the Yampa workings being sent down the
the Craig tunnel for extraction. The management is said to plan
ie shaft to 1,500′ depth. Ore is hauled, in the Craig tunnel, in trains
-ton cars, by 2 electric locomotives. As the ore is soft, heavy tim-
required, square sets being used.

ment includes an electric hoist, at the head of the blind shaft, on
evel. There also is a hoist actuated by compressed air. The power
r the portal of the Craig tunnel, has steam and electric power, with
Ingersoll-Rand air-compressor.

mine has a 12,300′ aërial tram, the longest in the Bingham camp,
on ore-bins at the upper terminal. The tramline saves about 25 cents
n transportation and insures an adequate ore supply for the smelter,
at the lower end of the tram. The smelter is described under title
ter, the Yampa Smelting Co.

ction was 4,699,765 lbs. fine copper in 1906 and 5,001,255 lbs. in
Yampa mine, though small, is valuable, and the management is good.

ILVER CROWN MINING CO. **UTAH.**

: 508 Auerbach Bldg., Salt Lake City, Utah. Mine office: Mam-
b Co., Utah. Hon. John A. Edwards, president; Dr. L. W. Snow,
ent; Mansfield L. Snow, secretary, treasurer and general manager;
officers, C. E. Cole and M. K. Green, directors. Organized Aug. 20,
r laws of Utah, with capitalization $100,000, shares $10 par; issued,

, 25 claims, area circa 500 acres, well watered and fairly timbered,
ne Belle district of West Tintic, 8 miles from a railroad, showing

fissure veins in porphyritic rocks and contact deposits in crushed quartzite, there being 10 ore bodies, of which 3 are under develop showing a 10" paystreak of massive galena, estimated to average 12 oz. silver and 75 cents gold per ton.

Development is by three 50' shafts, three 40' tunnels, a 100' tun 250' tunnel. Company plans continuous development.

TINTIC SMELTING CO.

Office: Salt Lake City, Utah. Works office: Silver City, Juab Chas. W. Nibley, president; Jesse Knight, vice-president and general H. E. Rolapp, secretary; John Pingree, treasurer; Bela Kadish, superi preceding officers, David Eccles and C. E. Loose, directors; Howard P. mechanical engineer; Richard F. McCaffrey, metallurgical super Organized circa December, 1906, with capitalization $500,000, share

Property is a newly built reduction plant, of 350 tons daily planned as the first unit of a 700-ton smelter, works including a mill. Smelter has two 14x60' hand-roasters, 4 Kelly cintering conve two 46x162" lead furnaces. The copper department is to include steel frame building, having a 125-ton blast-furnace. Plant is o design, and well equipped throughout, and works are well located for lead ores, with considerable copper ore available, and should prove benefit to the Tintic district and adjoining fields. Planned begin smelting July, 1908, and copper smelting circa September, 1908.

TINTIC STANDARD MINING CO.

Mine office: Eureka, Juab Co., Utah. E. J. Raddatz, general Organized circa October, 1907, with capitalization $1,000,000. L claims, having a fissure vein of 30' to 80' estimated width and a 2 showing low grade lead ore, with gold and copper values.

SOCIEDAD DE LAS MINAS DE COBRE TINTO y SANTA ROSA.

Office: Rue Archimedes, 1, Brussels, Belgium. Mine office: Za Real, Huelva, Spain. Capitalization, 3,000,000 francs. Lands, 111 including El Tinto, Santa Rosa and 9 other old mines. Has a 7- aërial tram to Calañas. Property is leased to the United Alkali Co.,

TIPTON COPPER CO. NEW

Dead. Formerly at Tularosa, Otero Co., N. M.

TIP TOP COPPER CO. A

Office: Commonwealth Bldg., Philadelphia, Pa. Western office: Blk., El Paso, Tex. Mine office: Helvetia, Pima Co., Ariz. Geo. president; S. Charles Pratt, vice-president and general manager. O 1902, under laws of Arizona, with capitalization $1,150,000, shares $1

Lands, 24 claims, area 400 acres, including the Tip Top and Cop claims, also a 100-acre millsite, in the Helvetia district, showing 3 veins, averaging 14' width, carrying carbonate and sulphide ores, givi age assays of 5% copper and 1 oz. silver per ton, with a trace of gold by 7 shafts, of 10' to 150' depth, and several tunnels, longest 958', wi 4,000' of workings. Has gasoline power and has developed consider Was bonded, 1907, to Guggenheim interest, for $250,000, with cash of $75,000, but both parties to bargain were dissatisfied, and property to owners. Made considerable ore shipments, 1906-1907. Production was 298,890 lbs. fine copper. Property considered promising.

TIP TOP COPPER CO. NEW M

Dead. Lands sold, circa 1908, to Burro Mountain Copper Co., for Was akin to a swindle; final dividend to shareholders was 1 mill on the Formerly at Silver City, Grant Co., N. M. Described Vol. VII.

TOP MINE. **ONTARIO.**

Office: Port Arthur, Ont. Mine office: Kashaboiwe, Rainy River district, Col. S. W. Ray, manager; Richard Sandoe, superintendent.

Lands, 4 claims, freehold, area 336 acres, known as locations K62, K63, and K65, 6 miles from Kashaboiwe, on Round Lake in Moss township, ing schist and diorite, carrying 3 contact deposits, ranging up to 150' in , with 2 ore bodies, of 25' estimated average width, carrying circa 18' giving average assays of 7% copper, 5 to 12 oz. silver and $1 to $2 gold ton. Development is by shafts of 50' and 208', with 640' of workings, ated to show 45,000 tons of ore, which seems high. The mine is said to blocked out a considerable amount of ore, of 4 to 6% in copper tenor, on n ranging up to 60' width in the bottom workings.

Equipment includes a 100-h. p. steam plant, with 10-h. p. and 30-h. p. s, and a 5-drill Ingersoll-Sergeant air-compressor. Part of the material smelting plant was secured, 1907, but apparently erection of smelter not . Property considered promising.

PAÑIA MINERA DEL TIRO GENERAL, S. A. **MEXICO.**

Office: 2a Ojcaliente No. 8, Aguascalientes, Mex. Mine office: Charcas, Luis Potosí, Mex. J. G. Creveling, Jr., president and general manager; Layer, vice-president; G. B. Wardman, secretary and treasurer; preced- fficers, Thos. J. Ryder and O. F. Westlund, directors; DeWitt Creveling, intendent; E. J. Cloyd, assistant superintendent; William Mueller, mine intendent; Pablo Fuentes, engineer; W. O. Staples, auditor. Organized 31, 1902, under laws of Mexico, with capitalization 375,000 pesos, shares esos par. Dividends, 1905, were 150,000 pesos.

Lands, 71 pertenencias, area 176 acres, also 25 acres of millsites and a re farm, in the Charcas district. The mine shows 2 main systems, carry- issure veins in porphyry, not far from a limestone contact, the North vein aging 3 to 8 meters width, with known length of circa 450 meters, de- ed for 350 meters length by shafts of 300m., 200m., 130m., 130m., 90m., and 55m., with upwards of 3,000 meters of workings on the North, or vein, showing circa 200,000 metric tons of ore. The workings on the h zone are idle, awaiting the establishment of a concentrating plant ted to this ore, which is of milling grade. The ore developed in the h zone is almost exclusively sulphide, and averages 2% copper, 5% lead, zinc, 430 grams silver and 0.8 grams gold per ton.

The mines, discovered circa A. D. 1583, were worked on a small scale for ly 3 centuries, and on a larger scale since 1859. The property has a 340- steam plant for hoisting and pumping, and in addition makes some use nalacates. Equipment includes 80-h. p. and 100-h. p. hoists, a Cameron on pump, and a 10-drill air-compressor. There is a combination machine carpenter shop, of stone, with good equipments.

The 100-ton mill is planned to be increased to 250 tons capacity. The l as a large number of structures, for various uses, all built of stone, in- ng, a general store, etc.

The stockholders of this company own the Potosí Central railroad, of kilometers length, running from the mine to Las Charcas station, on the can National railroad.

Fuel is Laredo coal, costing $6.85, gold, per ton, delivered, and eastern costing $8.40, gold, per metric ton, delivered. Production, 1905, was 761 lbs. fine copper, made from 48,000 metric tons of ore carrying 2.16% r. Production, 1907, estimated at 2,250,000 lbs. fine copper. Ore costs d per dry metric ton, f. o. b. cars of Mexican Central Railway. Forces, ally, are about 750 men.

Company is a close corporation, with only 35 shareholders. The ment is good, and the property is one of proven merit.

TITANTIC COPPER CO. AR

Office: 224 Milk St., Boston, Mass. Mine and works office: Coconino Co., Ariz. Organized June 3, 1907, under laws of Arizona, w talization $1,000,000, practically as successor of Anita Copper Co., w its lands through foreclosure.

Lands, 50 claims, area 1,000 acres, lying on both sides of the Brig branch of the Santa Fé railway, also a 160-acre millsite and 60 acres neous lands, giving total holdings of 1,220 acres. Property shows erous limestone strata of circa 800′ thickness, carrying 3 irregular or of which one, slightly developed, has oxide and carbonate ores 8 to 15% copper, and 3 to 4 oz. silver per ton, opened by shafts of and 580′, with several short tunnels. Ore, as extracted, carries 4 to 8%

Equipment includes a Fairbanks & Morse gasoline hoist, a 12-dr air-compressor and 8 power drills.

The smelter, at Williams, 47 miles from the mine, with direct munication, has a 100-ton water-jacket blast-furnace, with other eq for a 200-ton smelter.

The company had a contract with the Consolidated Arizona Smelt to furnish fluxing ores, on a basis of 75 cents per ton and 40% of or extracted, the Consolidated Arizona doing the mining, but owing t ruptcy of latter-named company, the contract was terminated, and was idle at last accounts.

GUSTAVO TITUS.

Mine and works office: Olmué, Limache, Valparaiso, Chile. L kilometers from the railway station of Limache, include the Felicidad, ancia and Veta Grande mines, showing large quantities of low grade an and argentiferous copper ore. Smelter, having 1 reverberatory fur 1903 treated 1,300 metric tons of ore averaging 3.5% copper, producin from ejes of 46.89% average copper tenor, carrying 79,702 lbs. fine cop

TOBACCO ROOT RANGE MINING CO. MO

Dead. Formerly at Mammoth, Madison Co., Mont.

SOCIEDAD BENEFICIADORA DE TOCOPILLA.

Office: Valparaiso, Chile. Works office: Tocopilla, Antofagasta Organized Sept. 7, 1906, under laws of Chile, with capitalization shares £1 par.

COMPAÑIA THE TOCOPILLA SMELTING WORKS.

Office: Valaparaiso, Chile. Works office: Tocopilla, Antofagasta Organized Aug. 11, 1906, under laws of Chile, with capitalization 500,0 shares 50 pesos par. In liquidation, 1907.

TODD COPPER CO. **ARIZONA & CALIF**

Office: Lankershim Bldg., Los Angeles, Cal. Mine office: Eh Yuma Co., Ariz. U. S. G. Todd, president; E. Julian Solomon, vice pr Wilbur H. Dran, secretary; preceding officers, Dr. H. Pittman and H Booker, directors. Organized Jan. 6, 1907, under laws of Arizona, wi talization $5,000,000, shares $1 par. Lands, 3 claims, area 60 acres, Weaver district, circa 12 miles east of Ehrenburg, also 4 claims in Woman Mountains, San Bernardino county, California. Planned de Ehrenburg claims by tunnel.

TOKAR (SUDAN) PROSPECTING SYNDICATE, LTD.

Office: 7 Devonshire Square, London, E. C., Eng. Sir F. Fra chairman; Felix F. Wilson, secretary. Organized Dec. 2, 1904, with zation £5,000, shares £1 par. Property is a license, from the Sou ment, to prospect for minerals. Location of prospecting righ

y between 17° 30′ and 18° North Latitude, and between 37° 45′ and
)′ East Longitude. Copper float is found over an area of circa 150 miles
, in a mountainous region near the Eyrthrean border, inhabited by the
, a tribe of ebony Arabs. Country rocks are schist, having a strike of
of north, and a westerly dip, associated with eruptive crystalline rocks,
ng numerous veins of low grade ore, averaging about 2% copper only.
ently no work in progress.

DO MINING & POWER CO. **MONTANA.**

)ffice: 108 LaSalle St., Chicago, Ills. Mine office: Brandon, Madison
Mont. Louis D. McCall, president and general manager. Organized circa
with capitalization $50,000, apparently as successor of Bismarck-Nugget
Consolidated Mining Co. Lands, 17 copper claims and 18 gold claims,
ups of copper claims being on Stone Creek, in the Ruby Mountains.
erty has a 60-ton concentrator and a 30-ton smelter. Idle and presumably

ÉTÉ ANONYME MINES METALIQUES DE TOLOSA. **SPAIN.**

)ffice: Monceau les Mines, France. Letter returned unclaimed from
er mine office, Leiza, Navarra, Spain. Capitalization, 715,000 francs, 500
s par. Property comprises iron mines in Guipúzcoa, and lead-copper
s at Navarra, latter including the Regina and other mines, partially pros-
d, and presumably idle.

TEC METALLURGICAL CO. **MEXICO.**

Office: 743 Equitable Bldg., Denver, Colo. Mine office: Matehuala,
ree, San Luis Potosí, Mex. Jas. A. Kilton, president and general man-
; Edw. F. Welles, vice-president and treasurer; John S. Gibbons, secre-
Organized under laws of Arizona, with capitalization $1,500,000, shares
ar, and protocolized under the laws of Mexico.
Lands, 798 acres of mineral lands, and a 200-hectare smeltersite. Property
des La Cobriza mine, idle; San Diego mine, having a 600′ shaft, showing
ssaying 49 to 93 oz. silver per metric ton, and the Candelaria mine, hav-
n 877′ tunnel, carrying silver-lead ore of tenor up to 60% lead and 10 to
z. silver per metric ton, also showing some auriferous copper ore carry-
p to 6% copper. Planned, 1906, building a 150-ton smelter, with lead
copper stacks, at Estación Vanegas, on the main line of the Mexican
nal railroad, about midway between Monterey and San Luis Potosí. Com-
made extremely florid promises, and an explanation seems due to share-
rs.

TEC MINE. **MICHIGAN.**

Office: care of Alfred Meads & Sons, owners, Marquette, Mich. Mine
: Greenland, Ontonagon Co., Mich. Lands, 320 acres, carrying the un-
y of the Evergreen belt and the Calico and adjacent beds of the Mich-
Production, 1851-1860, was 413,443 lbs. fine copper. Diamond drilling
begun, circa April, 1908.

TEC MINING & SMELTING CO. **MEXICO.**

Office: care of A. W. Cunningham, president, Waco, Tex. Mine office:
la, Oaxaca, Mex. A concentrator, planned 1906, seems lacking still. Idle
presumably moribund.

WONG MINERAL CO., LTD. **AUSTRALIA.**

Mine office: Shoalhaven, N. S. W., Australia. Organized circa January,
, under laws of New South Wales. Lands show arsenical copper ores.

AHAWK COPPER & ZINC MINING CO. **ARKANSAS.**

Dead. Formerly in Marion and Searcey counties, Arkansas.

AHAWK JUNIOR MINING CO. **MICHIGAN.**

Office: care of H. F. Fay, 60 State St., Boston, Mass. Mine office: Calu-

met, Houghton Co., Mich. Organized circa June, 1899, under laws of M
Lands are in Keweenaw county. Idle since organization.

TOMBSTONE GOLD, SILVER & COPPER CO. AI

Office: Bisbee, Ariz. Mine office: Tombstone, Cochise Co., Ariz
Shelor, president; R. C. Spink, vice-president; Dr. T. M. Smith, secretar
Haighton, treasurer; A. T. Schuster, superintendent; preceding office
Wahrenberger, S. C. Edmiston and M. W. Larsen, directors.

TOMBSTONE MINING CO.

Mine office: Mullan, Shoshone Co., Idaho. O. A. Larson, John
John Erickson and Hans J. Rice, directors. Capitalization $1,500,000
$1 par. Lands, 9 claims, on Stevens Peak, south of Mullan, showing
of circa 15' width at surface, with good ore indications. Development
500' crosscut tunnel. Property has given ore assaying up to 15% cop
2.5 oz. silver per ton.

TOM HAL MINING CO. WASHI

Mine office: Pateros, Okanogan Co., Wash. Thos. B. Warren, p
and general manager, at last accounts. Company is a dead-beat. I
claims, said to show a 4' to 10' vein, carrying auriferous and slightly s
erous chalcopyrite, arsenopyrite and pyrite. Idle several years and pre
moribund.

TOM MOORE CONSOLIDATED MINING CO. COL

Dead. Succeeded by Tom Moore Gold Mining Co. Formerly at
San Juan Co., Colo.

TOM MOORE GOLD MINING CO. COL

Office: 1 Wall St., New York, N. Y. Mine office: Eureka, S
Co., Colo. Samuel G. Martin, superintendent. Organized, circa 1907, w
talization $10,000,000, which is excessive, as successor of Tom Moore
dated Mining Co. At last accounts Dennis Ryan, of St. Paul, was sui
Martin for an accounting. Has auriferous and argentiferous lead and cop

TOMS MINING CO. WY

Letter returned unclaimed from former office, West Chester, P
office: Encampment, Carbon Co., Wyo. W. H. Taylor, managing
Lands, 9 miles east of Encampment, have a tunnel and an 85' shaft
show good ore. Idle and presumably moribund.

TONGASS COPPER CO. A

Office: Seattle, Wash. Letter returned unclaimed from form
office, Ketchikan, Alaska. Is closely connected, in management an
ship, with the Hydah Copper Co. Lands, on Thorn Arm, are said
copper ore carrying some gold and considerable silver.

TONOPAH-ALOHA MINING CO. N

Dead. Formerly at Tonopah, Nye Co., Nev.

TONOPAH COPPER MINING & MILLING CO. N

Office and mine: care of E. C. Day, vice-president, Tonopah,
Nev. E. C. McDow, president; Herman Brunell, secretary and treasu
ceding officers, Edw. Billings and Col. John W. Carney, directors. O
ctober, 1905, under laws of Arizona, with capitalization $2,000,000
50 cents par.

Lands, 5 claims, area 100 acres, in the Silver Star district of Es
county, about 60 miles west of Tonopah, claimed to show ore assaying
copper, lead, silver and gold. Company apparently was floated with th
ance of Letson Balliet, a well known promoter of crooked mining com
Company sent out 200-share stock certificates, apparently at random
request to recipients to pay $1 per month thereon. Is not favorably re
and apparently is moribund.

OPAH GOLD & COPPER MINING CO. **NEVADA.**
Dead. Formerly at Tonopah, Nye Co., Nev. Fully described Vol. VI.

OPAH-GREENWATER COPPER CO. **CALIFORNIA.**
Mine office: Greenwater, Inyo Co., Cal. Geo. H. Keyes, president and urer; H. D. Danforth, vice-president; Fredk. Tarbell, secretary. Capitali- n, apparently $1,500,000, shares $1 par. Lands, 8 claims, area 160 acres, to adjoin the Iron Mask group.

OPAH-NORTHERN MINING CO. **NEVADA.**
Office: 501 O. T. Johnson Bldg., Los Angeles, Cal. Letter returned un- ed from former mine office, Manhattan, Nye Co., Nev. Capitalization 0,000, shares $1 par. Lands, claimed to be 130 acres, at South Man- n, said to have a 100′ shaft on a 4′ 6″ "fissure vein" between porphyry limestone, bottomed in sulphide ore, giving assays of 6.8 to 34.4% copper, 7 oz. silver and $2.06 to $13.22 gold per ton. Idle and apparently mori-

OPAH-YERINGTON COPPER CO. **NEVADA.**
Mine office: Yerington, Lyon Co., Nev. Organized 1907, under laws of na, with capitalization $1,000,000. Presumably idle.

TO RIVER COPPER CO. **ARIZONA.**
Office: Pittsburg, Pa. Mine office: Roosevelt, Gila Co., Ariz. S. V. pson, manager. Lands, 79 claims, known as the Schell group, on Tonto k, circa 60 miles from Globe, showing well mineralized ledges carrying erous copper ores giving high assay values in copper, opened by shafts tunnels, with circa 750′ of workings.

EKA COPPER CO. OF ARIZONA. **WYOMING.**
Office: 817 Kansas Ave., Topeka, Kans. Mine office: Centennial, Al- Co., Wyo. Wm. Benton, president and general manager; Dr. N. A. Kra- vice-president; M. F. Reed, secretary and treasurer; G. S. Simons, super- ndent; preceding officers and John R. Bellinger, directors; Sydney Bart- engineer. Organized March 3, 1906, under laws of Arizona, with capi- ation $1,000,000, shares $1 par; issued, $500,000.
Lands, 11 claims, partly patented, area 205 acres, known as the Maudem , in the Lake Creek district, showing fissure veins in granite and diorite, contact deposits between syenite and limestone, ore bodies carrying a little ized ore near surface, with sulphides at depth. The property has 4 ore es under development, principal vein, the Maudem, of 7′ estimated average th, said to be traceable circa 2,100′ carrying oxidized ores near sur- , with chalcocite, bornite, chalcopyrite and tetrahedrite at depth, esti- ed to average 12% copper, 1 to 8 oz. silver and $10 to $160 gold per ton. Maudem mine has a 60′ shaft and an 820′ tunnel, and the Lake Creek e has shafts of 40′ and 70′ and tunnels of 265′ and 365′, property as a le having circa 1,500′ of workings. The Maudem or Joe Davis, and Lake ek mines, are about one mile apart. Company plans continuing the Man- n tunnel to 1,200′ length and adding a light mining equipment.

PEKA MINING CO. **COLORADO.**
Mine office: Russell Gulch, Gilpin Co., Colo. Has gold, silver and cop- ores.

QUIMA COPPER CO. **NEVADA.**
Office and mine: P. O. Box 9, Manhattan, Nye Co., Nev. W. J. Stock, sident; Omer Maris, vice-president and manager; F. P. Jayne, secretary and asurer; preceding officers, J. B. Giffen and L. W. Haworth, directors. Or- ized August, 1906, under laws of South Dakota, with capitalization 00,000, shares $1 par.
Lands, 7 claims, area 120 acres, east of Manhattan and 34 miles from a ay, showing a mineralized zone apparently of about 600′ width, traceable

circa 2,000'. At surface the mineralized zone shows irregular mixtu
altered schists and coarsely crystalline limestone, with frequent irregular g
and iron blowouts, with considerable decomposed ferruginous lime,
friable, with quartz outcrops, all of the various rocks showing carbonat
per stains. Development is by a 180' shaft, at an angle of 65°, on wh
parently is the footwall of the mineralized zone, this shaft showing
bornite, but mainly chalcopyrite below a depth of 20'. Equipment incl
small electric plant, Cornish pump and whim.

TORCH LAKE MINING CO. MICH

Office: care of Thatcher Loring, president, 3-19 Central St., Boston,
Mine office: Leopold Bldg., Houghton, Houghton Co., Mich. Capital
$500,000, shares $25 par. Lands, 1,280 acres, being Sections 35 and 3
56 North, Range 33 East, lying east of the Tecumseh and midway b
Calumet and Lake Linden. Was slightly prospected, 1899-1900, by d
drill borings. Since idle.

TORPEDO MINE. NEW M

Office: 135 Adams St., Chicago, Ills. Mine office: Organ, Donna A
N. M. Geo. E. Wood, president; Harvey E. Rich, secretary; Geo. F
gerald, general manager; R. E. Pringle, engineer; L. G. Tucker, audit

Lands, 16 miles west of Las Cruces, near the Copper Bar mine, ca
ticular ore bodies between limestone and granite, said to be increasing
with depth. Mine, 500' deep, opened circa 1876, is said to have p
upwards of 4,000 tons of ore averaging 14% copper, and some seco
ore of 6% copper tenor was scrammed and shipped from waste dump
steam power. Owing to water inflow of circa 800 gallons per minute, m
idle from 1903 until summer of 1907, when shipments of one carlo
were made to El Paso smelter. Was said, August, 1907, to be building a
matting furnace. Property considered promising.

TORPEDO MINING CO. NEW M

Dead. Property sold, Aug. 11, 1906, to Geo. E. Fitzgerald, et al. I
at Organ, Donna Ana Co., N. M. Described Vol. VI.

COMPAÑIA METALURGICA DE TORREÓN, S. A. M

Office and works: Torreón, Viesca, Coahuila, Mex. Ernesto
president and general manager; Col. Carlos Gonzalez, vice-preside
Pragedis de la Peña, secretary; Lic. Pedro Torres Saldeña, treasurer;
Villegas, comisario; F. S. Villareal, assistant general manager; D
Morgan, general mine superintendent; Ivan Ragaz, assistant mine sup
ent; Ernest Harms, general smelter superintendent; C. A. Heberlein,
smelter superintendent; Chas. Moser, J. W. Pender and Pedro Va
superintendents.

Organized June, 1901, under laws of Mexico, with capitalization
pesos, increased later to 2,500,000 pesos, and again increased,
5,000,000 pesos, shares 100 pesos par, in 1,500,000 pesos 6% preferred
able stock, and 3,500,000 pesos common stock. Paid dividends, April,
14 pesos on preferred and 12 pesos on common shares. Profits, 19
629,279 pesos, and 1906 were 775,285 pesos. Is controlled by the
family.

Lands are extensive, including a number of developed and d
lead mines, and several partly developed copper mines, in northern
The San Diego and Buena Suerte mines, at Santa Barbara, Hidalgo,
mainly galena and sphalerite, having a 200-ton concentrator, and e
about 500 men. Las Adargas mine, Jiménez, Chihuahua, has auriferou
lead ores, employing about 200 men. La Voladora and La Mitra i
Nuevo León, produce silver-lead ores, with a force of circa 100 m
Cabrillas and Las Higueras mines, at Los Muertos, Centro, Coahuila,

ores, and also have promising deposits of iron ore. Company also silver-lead properties of lesser development.

nelter, having connections with all railroad lines entering Torreón, 1,250 tons daily capacity, doing a general custom business on gold, and copper ores, in addition to treating the large production of ay's own mines. Smelter has 10 blast-furnaces, including 8 lead 2 copper stacks, with 8 reverberatory roasters for lead matte, the product carrying only 10 to 15% lead, which is calcined and re- converter plant was added, 1907, to the copper plant. The works ut 600 men.

l the smelter treated 71,294 metric tons of ore, in 1904 treated tric tons, and in 1906 smelted 258,572 metric tons, showing a very growth. Production, 1907, is estimated at 1,250,000 lbs. fine copper. ent through the 1907 panic in better shape than perhaps any other nelter, and is one of the most successful and well-managed metal- erprises in the republic, its success being especially notable because ve works are owned and controlled by Mexicans, who have shown y to compete, on even terms, with the ablest American and Euro- g men and financiers.

SMELTER. **MEXICO.**

by Compañía Metalurgica de Torreón.

OPPER CO. **MONTANA.**

returned unclaimed from former office, Pennsylvania Bldg., Butte, ie office: Toston, Broadwater Co., Mont. David J. Charles, presi- H. Renisch, vice-president; John A. Shelton, secretary; W. K. eneral manager. Organized Dec. 24, 1903, under laws of Arizona, lization $1,250,000, shares $5 par. Lands, 6 claims, area 120 acres, fissure veins in porphyry, with a 200' shaft in a vein of about 15' dth, carrying chalcopyrite with estimated average tenor of 6% z. silver and $2 gold per ton. Idle.

LLE COPPER CO. **NEW YORK.**

Foot West 29th St., New York, N. Y. Works office: Tottenville, Co., N. Y. W. M. David, superintendent. Property is a smelting factory for working copper and brass into commercial forms.

MINE. **JAPAN.**

by Fujita-Kumi & Co.

ELTER. **BRITISH COLUMBIA.**

by Canadian Smelting Works.

NING CO. **WYOMING.**

ffice: Rambler, Carbon Co., Wyo. J. B. Barriani, president; J. H. e-president; W. G. McClintock, secretary and treasurer. Lands, ear the Itmay. Presumably idle.

MINE. **MONTANA.**

two-thirds by Butte & Boston Consolidated Mining Co., and one- itte Coalition Mining Co. Described under name of latter.

NTINENTAL SILVER & COPPER MINING CO., LTD. **IDAHO.**

23 West Granite St., Butte, Mont. Letter returned unclaimed r mine office, Mullan, Shoshone Co., Idaho. Hon. W. W. Woods, Geo. E. Marlowe, secretary and treasurer; A. J. Gillis, general receding officers, Col. Thos. Marshall and Thos. Marlowe, directors. circa 1906, with capitalization $1,500,000, shares $1 par. Lands, near the Reindeer mine, south of Mullan, showing a vein of 100' lth, producing surface ores assaying up to 14% copper and 2 oz. on. Has a 110' tunnel.

TRANSVAAL COPPER CO. M

Office: 1408 Traction Bldg., Cincinnati, Ohio. Mine office: Moctezuma, Sonora, Mex. Louis J. Hauck, president; Louis Hehma president; J. M. Eilers, second vice-president; H. C. Beauchamp, sec Alfred Vogler, treasurer; preceding officers, Percy Andrae, Bernard F F. H. Cloud, Theo. M. Foucar and O. C. Rasch, directors; Jas. T. Mc mine superintendent. Organized December, 1901, and reorganized July under laws of West Virginia, with capitalization $6,200,000, shares $ issued, $2,700,000.

Lands, 794 pertenencias, area 1,966 acres, also a 50-acre smelter si the Cloud ranch, of circa 15,000 acres area, with an interest in the San T Tolentino ranch, of about 26,000 acres area. The ranches include timb grazing lands, all property being in the Moctezuma district. The p shows 8 ore bodies, occurring as fissure veins and lenses, on which about of development work has been done, with deepest workings circa 600'.

The copper and silver-lead ore bodies occur as fissures, and also a mineralized dikes, in trachyte and rhyolite. Copper ores are mainly and chalcopyrite, with occasional chalcocite, carrying the usual oxide a bonate ores on the outcrops. The ore bodies of the Cobre Rico and Tr are mineralized dikes of apparently 200' to 300' width, carrying low copper sulphides, associated with iron pyrites and having a quartzose hence liable to prove silicious and require heavy fluxing. The Cobre R Transvaal No. 1 are estimated by the management to show about 2, tons of low grade ore.

The Cobre Rico mine has 2 shafts and 2 tunnels, showing ore of trating grade, estimated to average about 3% copper, 3 to 4 oz. sil $1.50 gold per metric ton. Shaft No. 1 is circa 100' deep and shaft 1 140' in depth, and the tunnels are of about 2,000' aggregate length. T is wide, exposing a considerable amount of ore.

The Transvaal mine has shafts of 210' and 318', with about a tunnels, blocking out considerable ore averaging circa 3% copper, 2 silver and $1 to $1.50 gold per ton. Equipment at the Transvaal in steam hoist, 2 Cameron pumps, two 80-h. p. boilers and a Sullivan pressor.

The Buckeye mine, opened by tunnel, with about 4,000' of workin vein of 18" to 50" width, said to average circa 12% copper, 10 to 35 and $1.50 gold per ton, with 2,500 tons of ore estimated to be blocked

The San Nicolás mine has a 250' shaft and circa 3,000' of tunnel oping a 4' vein carrying silver-lead values, said to average about 60 per ton, with 6,000 tons of ore blocked out for stoping. Equipment a steam hoist, two 80-h. p. boilers and a Sullivan air-compressor.

The Ultima Chanza mine is opened by circa 500' of tunnels, sho estimated to average about 10% copper, with gold and silver values.

The Virginia mine, having a vein estimated at 15' average widt ore carrying gold values estimated as averaging $12 per ton, devel circa 1,000' of workings.

The Guadalupe mine carries cupriferous iron ore, used for flu copper ores smelted by the company.

Buildings include an engine-house, boiler-house, shafthouse, mach office, laboratory, boarding-house, 6 dwellings and a 22x90' general st a branch store at the smelter. The company has a hospital, and a $5, phone system.

Nearest railroad is the Nacozari line, 26 miles distant, but a projec has been surveyed into the district by the Cananea, Rio Yaqui y Pacific company has laid out about 35 miles of wagon roads and 25 miles of t

of about $50,000, maintenance of roads and trails requiring about $5,000 . A small smelter, having a 35-ton reverberatory furnace, located at the ye mine, was blown in, 1905, but closed down shortly, owing to unsatis- y operation, and was again blown in, circa November, 1905, when it was o be making a matte carrying up to 65% copper, 55 oz. silver and $7 er ton.

he main smelter, 15 to 20 miles from the mines, at Cumpas, where located e of ample water supply and a good site, has a 150-ton water-jacket furnace, 42x120" at the tuyeres, and a 20-ton reverberatory furnace, with nd power for 2 additional 150-ton stacks. There also is a small sampling The power plant includes three 80-h. p. boilers, a tandem-compound en- nd a Connersville blower. This smelter was blown in May 1, 1906, doing eral custom business, producing matte averaging 40% copper, 100 oz. silver .5 oz. gold per ton, shipped to Nichols works for refining.

he smelter was blown out, October, 1907, and the mine closed a little remaining idle during 1908. The property is of considerable promise, but usly cannot be operated at a profit without rail transportation. About les of narrow-gauge line will be required to connect the smelter with the s mines, and this will not be a cheap line to construct. The smelter eeds direct rail connection for receipt of fuel and shipment of its pro- n. The company's management is composed of solid business men of standing.

SVAAL COPPER CO., LTD. **TRANSVAAL.**

ead. Formerly in the Subeni River district, Transvaal. Described Vol. VII.

SVAAL COPPER MINES, LTD. **TRANSVAAL.**

ead. Was liquidated, December, 1907. Officers were A. H. Oppenheim, kson, W. E. Blelock and W. Ross, directors, and F. T. Pressland, secre- Company was organized Oct. 18, 1905, under laws of Transvaal, with lization £70,000, shares £1 par; £55,000 issued. Lands were options on l rights to 16 farms, area 50,000 morgen, or circa 100,000 acres, east phant's River. Formerly in the Middelburg district of the Transvaal.

SVAAL COPPER MINING CO., S. A. **MEXICO.**

the Mexican incorporation of the Transvaal Copper Co.

AGNIE DES MINES DE TRANSYLVANIE. **HUNGARY.**

ine office: Brussels, Belgium. Organized 1903, with capitalization 00 francs, to develop mines of copper, lead, zinc, ochre, and coal, in ry. Presumably idle.

TÉ ANONYME DES CUIVRES DE TRANSYLVANIE. **HUNGARY.**

ine office: Budapest, Hungary. Comte de Choulet, chairman. Organ- ug. 25, 1907, under laws of Hungary, with capitalization 5,000,000 crowns, 100 crowns par.

RKSCHAFT TRAUTENSTEIN. **GERMANY.**

ine office: Benneckenstein in Harz, Braunschweig, Germany. A. ick, manager, at last accounts. Has 2 shafts, the Gertrude, of 36 meters, e Silber-Marie, of 162 meters, developing ores carrying zinc, lead and

ERS CONSOLIDATED MINING CO. **MEXICO.**

ad. Title changed, 1905, to Travers-Durkee Coppers. Formerly at uma, Sonora, Mex.

ERS-DURKEE COPPERS. **MEXICO.**

fice: 805 Rookery Bldg., Chicago, Ills. Mine office: Moctezuma, Sonora, Richard P. Travers, president; Henry R. Durkee, secretary and treas- preceding officers, Francis H. Leggett, W. C. Travers and F. S. Lewis, rs; Thos. Travers, *superintendent.*

Organized June 14, 1905, under laws of Arizona, as Travers Con Mining Co., with capitalization $6,000,000, increased October, 1905, to $1 shares $10 par, and name changed, December, 1905, to present title ern Trust & Savings Bank, Chicago, registrar and transfer agent. meeting, first Tuesday in June.

On Feb. 23, 1907, the company borrowed, of the Copper Queen Co Mining Co., $300,000, at 6%, on notes payable one-half in 2 years half in 3 years, secured by mortgage, the company giving the Copp notes for $300,000 and a bonus of 100,000 shares of stock, for $225, The company is said to have settled all deferred payments on the from proceeds of money borrowed from the Copper Queen. Mr. T said to have promised a dividend for January, 1909, but if so, the p not likely to be redeemed.

Lands, 11 groups, area, 1,410 acres, 3 miles from the forks of t river, also a 12,000-acre ranch, surrounding the mineral lands, bought, about $25,000, and the Marguerite and Inez claims, adjoining the lands. Property includes the Promontorio mine, in the Promontor tains, circa 35 miles southeast of Moctezuma, and about 80 miles nearest railway at Nacozari. The Promontorio is an antigua, said produced the copper from which were cast the bells on the old Moctezuma, built A. D. 1640. During the American Civil War ore from this mine was packed, on mules, 40 miles, to Guaymas, and s Swansea, for smelting.

The Promontorio shows diorite, granite and limestone, carrying o in a shear zone between granite and diorite. The company report body, under development, as circa 300′ wide, carrying a 30′ paystreak to average 20% copper, with circa 12.5% copper for an additional 2.25% copper for balance of 210′, with 3 oz. silver and $4 gold p high-grade ore and circa 2 oz. silver per ton in the low-grade ore, h ore being chiefly bornite and low-grade ore disseminated chalcopyrit pany also claims that 10′ of the ore in the 30′ paystreak will aver 40%, being massive bornite. Prof. W. A. Crosby states that the facts an ore body of practically 50′ width, 1,000′ or more in length, and of depth, bordered by a broader zone of relatively low-grade ore, i grading insensibly into the rock walls. The low-grade zone is upwar in width, with a granite footwall, also carrying low-grade impregn copper. Dr. Franklin Carpenter states that the zone of secondary en may be expected to continue to considerable depth. The claims put the company are excessive, as, although there is considerable bornit in the mine, the average grade of ore is too low in copper tenor to st ment, and should be concentrated or smelted on the ground, if it worked at a profit.

Development, 1906, consisted of a 125′ shaft and tunnels of 175′ with total workings of 1,125′, estimated to show 360,000 tons of hi ore, and 1,440,000 tons of low-grade ore, which figures are excessiv property is well situated for development by tunnel.

The Inez mine shows a large gossan, mined for flux, underneath cupriferous pyrrhotite, carrying small gold and silver values, and the also to have another ore body of promise, carrying auriferous and argen copper ore.

The mine has been developed, without steam power, by tunnels, company has planned utilizing a large available water power Yaqui river.

The company has a 7-mile narrow gauge railway, laid with T rails, from the mine to the smelter, and thence to the valley, connecting by

with Nacozari. The projected Yaqui river branch of the Southern Pacific ay is surveyed to pass a short distance from the Promontorio mine. he smelter, planned to have a 75-ton water-jacket blast-furnace, was ed to be blown in November, 1907, but at last accounts was not completed, f the material not being on the ground.

little production has been secured, from high-grade ore, shipped to rs at Douglas and El Paso. Apparently the company has failed to carry very liberal promises as to production and development, and presumably , and in all likelihood is in poor shape financially.

ERSELLA MINES, LTD. **ITALY.**

ead. Voluntarily wound up, December, 1902. Formerly at Traversella, , Piedmont, Italy. Described Vol. III.

ONA MINE. **MONTANA.**

ffice and mine: Butte, Silver Bow Co., Mont. Hon. W. A. Clark, owner; Jerry Connolly, manager. Lands, 2 claims, 1 fractional, area 34 acres, o have produced about $1,000,000 worth of silver ore. Is under bond, ng Aug. 14, 1909, to Messrs. Connolly and associates, who must pay the royalty and deepen main shaft 100′, from present depth of 200′.

IONT-DEVON COPPER CO. **MICHIGAN.**

ffice: First National Bank Bldg., Hancock, Mich. Mine office: Victoria, agon Co., Mich. Hon. Chas. Smith, president; Fred H. Begole, vice- ent; preceding officers, Jos. Bosch, Jas. B. Cooper, Henry L. Baer, Robt. T. an, and Chas. D. Hanchette, directors. Organized December, 1908, under of Michigan, with capitalization $2,500,000, shares of $25 par. Lands, 680 , including the old Tremont and Devon mines, directly west of the Victoria. ompany plans prospecting work, with a view to locating the probable rn extension of the amygdaloidal bed now under development by the Copper Co.

ITON MINING CO. **ARIZONA.**

ffice: 1028 Tribune Bldg., New York, N. Y. Mine office: Patagonia, Cruz Co., Ariz. Melvin Stephens, president; Jas. Vausiden, vice-presi- G. Dillingham, treasurer; preceding officers, Abraham Vausiden, Peter den, C. W. Henderson and H. W. Mason, directors. Capitalization 00, shares $1 par, in $300,000 of 7% preferred and $200,000 of common Was a reorganization of the Arizona Gold & Copper Co. Lands, 7 claims, 40 acres, 8 miles west of Patagonia, in the Tyndall district, having about of workings, including several shafts and a tunnel, latter showing a 12′ arrying ore assaying 3% copper, 3 to 15% lead and up to 10 oz. gold n. Has a concentrator and is said to have an 80-ton smelter.

TON MINING & DEVELOPMENT CO. **MONTANA.**

ffice: 42 Broadway, New York, N. Y. Mine office: Butte, Silver Bow ont. Employs circa 300 men. John D. Ryan, managing director; John general superintendent; Geo. F. McGee, mine superintendent. Organized 1905, under laws of New Jersey, with capitalization $2,500,000, as Colorado g & Smelting Co. and name changed, circa 1905, to present title. Is lled, through ownership of entire stock issue, by Amalgamated Copper Co. rnings were $481,826 for fiscal year 1907, and $67,259 for fiscal year 1908. nds, 35 quartz and placer claims, mainly fractional, area 220 acres, in the n limits of the Butte copper zone, including the Gagnon and Otisco mines, g argentiferous and highly zinciferous copper ores, averaging circa 2.75% and 3.5 oz. silver per ton.

e Gagnon mine has a 2,300′ three-compartment shaft, sunk at an angle the shaft being only 150′ from the Original shaft, the Gagnon, which the continuation of the Original vein, showing good ore in the bottom gs. *There also is an air-shaft of 1,800′*, circa 700′ west of the Gagnon

works, at Anaconda. The old reduction plant is held in reserve, for but otherwise is unlikely to be used again.

Production of ore was 146,954 tons for fiscal year ending June 85,260 tons for fiscal year 1908, the 1907 production giving a g $9.96 per ton. Production, 1907, is estimated at 7,000,000 lbs. fine

TRENTON-SONORA MINING CO.

Office: Trenton, N. J. Mine office: Tarachi, Sahuaripa, F. C. Garretson, general manager. Property includes the San Eduviges, El Porvenir and other mines, carrying copper, silver a developed mainly by tunnel, the San José mine showing an 18" highly auriferous chalcopyrite.

TRES AMIGOS GOLD MINING CO.

Mine office: Temosáchic, Guerrero, Chihuahua, Mex. B. L. manager. Is developing by tunnel, on a vein of 25' to 40' widt carry ore averaging 6% copper, 4 oz. silver and $10 gold per t

MINA TRES GRACIAS.

Office and mine: Chañaral, Atacama, Chile. Basilio Cac Roberto Caceres, manager. Has steam power, employing circa last accounts.

TREVEDDOE MINING CO., LTD.

Office: 13 Throgmorton Ave., London, E. C., Eng. Mine offi Cornwall, Eng. Col. Wm. F. Leese, chairman; R. Arthur Thom Wm. H. Adams, secretary. Organized Aug. 13, 1900, under la Britain, with capitalization £100,000, shares £5 par; issued, £95,000 £17,500 authorized, £16,000 outstanding, at 5%. Lands, 500 a 100-year lease, subject to rental and royalty, bearing tin and Production, 1902, was 60 tons of black tin and 175 tons of 7% Operations, 1904, resulted in a net loss of £2,250, and for 1906 of £158.

TRIANGLE MINES CO.

Mine office: McCabe, Yavapai Co., Ariz. Organized 190 claims, at McCabe, having a 378' shaft showing auriferous copp of fair assay tenor. Idle at last accounts, because of legal tr

chard T. Green, directors; Woolsey McA. Johnson, consulting engineer; Bull, superintendent.

ganized 1903, under laws of Arizona, with capitalization $5,250,000. $1 par, and capitalization changed, 1906, to $5,250,000, in $250,000 ed and $5,000,000 common stock, shares $5 par. The preferred cumu- stock has dividends in arrears since 1903. At end of fiscal year June 8, the company had in cash, notes and bills receivable, $32,000, with ons of high-grade ore and 25,000 tons of milling ore extracted, estimated th $220,000.

nds include a zinc property in New Mexico, copper lands in Arizona e Tri-Bullion group of copper claims in Jefferson county, Montana.

e Tri-Bullion group, area 180 acres, in the Pipestone district of Jeffer- unty, Montana, was said, 1907, to have 800′ of shafts and opencuts. ntly this has been idle for some time.

e Arizona claims include the Tri-Bullion group of 8 gold and silver apparently idle, and the Starlight group of 14 copper and lead claims, located in Godless Gulch, in the Stanley Butte district, 8 miles south Carlos. The Starlight mine was discovered 1886, but was not opened 903, because a part of the San Carlos Indian Reservation, until lands egregated, 1901. The Starlight group shows porphyry, quartz, granite nestone, carrying 3 known ore bodies, of 3′ estimated average width, oxidized ores estimated to average 8% copper, 10 oz. silver and $1 r ton, with more or less lead, zinc, antimony and bismuth, with some aying up to 8% copper, 40% lead, 10 oz. silver and $3.50 gold per ton. e is low in silica and rich in lead and iron, rendering it self-fluxing, istanding the existence of highly deleterious elements. The Starlight as shafts of 140′ and 200′, and a tunnel, planned to connect with the t 1,000′, giving a back of 500′. The Will Ryan group has a 1,200′ t tunnel, said to show considerable quantities of low-grade ore. The ht group shows the wreck of an ancient adobe smelter, remaining from rations by Mexicans or Spaniards.

e Kelly mine, which is the company's principal property, area 13 near Magdalena, is primarily a zinc mine, with considerable lead but carries some copper, the upper working showing mainly zinc car- . First grade lead ore is said to run 20 to 25% zinc, and 8 to 12% nd zinc ore is said to average up to 2% copper, 32 to 35% zinc, 3% rea 8 oz. silver and 75 cents gold per ton. There is evidence of increas- pper values with depth. Development is by the Kelly, Paschal and shafts, latter, of 3 compartments, with a steel gallows-frame, being show a 40′ ore body on the 300′ level. The Nit mine, adjoining the , is said to show a body of heavy sulphide ore. The company estimated, 907, that by the end of the year it would have enough ore blocked 10 years' production.

uipment at the Kelly mine includes a power-house with three 150-h. p. an 18x36″ first-motion double-cylinder double-drum hoist, and a 15-drill ll-Rand air-compressor.

1907 the company planned building a 50-ton plant, at Cañon City, t Co., Colo., to make zinc-lead pigment and zinc oxide, but apparently ction of this plant has been abandoned.

e mill, at the Kelly mine, built 1907, by the Traylor Engineering Co., tly was not a success, and was remodeled and enlarged, 1908, and nned to go into commission circa January, 1909.

e Kelly mine is leased, above the fourth level, to Coney T. Brown, but as resumed by the company, November, 1908. The management gave ration, 1908, *to exchanging stock* of the company for stock in the

Kelly Smelting & Refining Co., owning property near the Kelly mines Mexico, and in Jefferson county, Montana, but this plan was unpopu shareholders, and apparently was dropped. Many shareholders are dis with the management, and have proposed an investigation. Proje sidered promising.

TRIMETALLIC MINING, SMELTING & REFINING CO.

Office: care of P. Sandoval, treasurer, Nogales, Ariz. J. L. Shepa dent. Lands, 9 groups of claims, in the Ures and Hermosillo districts Mexico, with a government concession for the equivalent of about miners' inches of water from the Yaqui river, which, under an effect of 160', could be made to develop a large water-power. Lands sh erous and argentiferous copper ores. Property considered promisi sumably idle.

TRIMOUNTAIN MINING CO.

Office: 82 Devonshire St., Boston, Mass. Mine office: Tri Houghton Co., Mich. Employs circa 800 men. Wm. A. Paine, preside eric Stanwood, secretary and treasurer; Frederick W. Denton, general preceding officers, J. Henry Brooks, Chas. A. Snow, Chas. H. Paine R. Stanton, directors; John Jolly, superintendent; Edw. Koepel, mi tendent; H. T. Mercer, engineer; Benj. D. Noetzel, clerk; Richard mining captain; Jas. Vial, master mechanic at mine; Jas. Richard mechanic at mill; Will Harris, supply clerk.

Organized 1899, under laws of Michigan, with capitalization shares $25 par; paid in, $20. Is controlled, through ownership of 99,1 by Copper Range Consolidated Co. Old Colony Trust Co., Boston, Annual meeting, second Wednesday in February.

The company paid $300,000 dividends, under a former manage paid a $5 dividend, of $500,000, Apr. 22, 1908, this being the first present management. Mining profits, 1907, were $491,480.76, with a tion account of $66,084.29, and net earnings for year were $380,302.15 ending 1907 with a surplus of $1,086,299.64. The final installment o mountain debt was paid January, 1908, by A. C. Burrage, as per agr

Lands, 1,120 acres, being the E. ½ of Section 19, W. ½ of S N. ½ of Section 29, and NE. ¼ of Section 30, all in T. 54 N., R. 3 Baltic mine is to the north, and the Champion to the south, with u lands to the east and west.

Owing to a very heavy sand overburden surmounting the ledge was opened by sinking drop-shafts through the alluvium, raising the face on the angle of dip of the bed. The Baltic lode runs 15' to 5 the Baltic tract, with an average width of about 25', usually being eralized throughout, mass and barrel copper occurring near the wall upwards of a ton in weight have been found, but values occur mainly rock. The two end shafts, toward the Champion and Baltic mines, than those in the middle, but there are prospects of better copper v depth, and a slow but fairly steady improvement has been noted, for past. The mine has electric pumps, and, during 1907, made 7,528' of ings. The shafts are all of the same size and style, being 8x22' timbers, with 3 compartments, framed with 14x14" sticks, exception timbering being required to withstand the pressure of shifting sand solid rock. Shafts 1 and 4 are the chief producers.

Lying parallel with and circa 65' west from the Baltic lode is a amygdaloidal bed, carrying some heavy copper and considerable s This, opened by a crosscut from the 7th level of No. 1 shaft, has bee to some extent, but nothing of great importance found. The gre width of the lode has led to successful experiments in dry walling w

Though at first ridiculed by some conservative mine managers, the use lls for underground walls has proven its worth in the mines of the Baltic and is being adopted quite generally in other Lake Superior mines. -rock is used also for building underground chutes. These are roughly ar, with inner diameter of about 5′, and are built and filled about with as stopes are carried upward, the chutes being built at a sharp pitch. s feared that descending rock might catch upon projections of the inner of rough mine-rock, but in practice no such trouble occurs, the wedging rounding waste-rock serving to hold the walls immovable. The saving bering resulting from the use of dry-walling and mine-rock chutes is reat.

o. 1 shaft, 1,675′ deep, Jan. 1, 1908, sunk at an angle of 68°, is 210′ of the Champion boundary line. This shaft has a sand overburden of 40′ depth, with first level opened 168′ below the collar, levels being 100′ from thence downward, No. 1 shaft developing a long stretch of excep- y uniform stoping ground, of good average grade. Equipment at No. 1 es a 2,500-h. p. Nordberg direct-acting duplex hoist, with 36x72″ cylin- nd double-conical drum, of 18′ maximum diameter, with capacity for 6-ton skips from one mile depth. The shaft-rockhouse is of wood.

o. 2 shaft, 1,023′ northeast of No. 1, was 1,575′ deep, Jan. 1, 1908, sunk at le of 68°, with a steel and concrete collar, built 1907. This shaft shows ing ground below the 14th level. The shaft-rockhouse, 40x62′ on the , and 84′ high, of steel frame, iron sheathed, has 2,000-ton rock-bins, ient including an engine, steam-hammer and two 18x24″ crushers. The s a duplicate of that at No. 1.

o. 3 shaft, 1,027′ northeast of No. 2, sunk at an angle of 68°, was 1,425′ Jan. 1, 1908. This shaft has a sand overburden of about 60′, and ground h disturbed below the 2d level, but the formation becomes more settled ater depth, where better stopes are shown, and there is a material im- ient in values below the 14th level. Equipment includes a shaft-rock- and hoist that are duplicates of those at No. 2.

o. 4 shaft, 1,100′ deep, Jan. 1, 1908, shows some of the best stopes in ne. The shaft-rockhouse is a duplicate of those at shafts 2 and 3, but ist is a temporary engine, good for a quarter-mile depth, which is to be d, eventually, by a hoist similar to those at the three other shafts.

o. 5 is merely the site for a shaft, there being an overburden of sand, with boulders, 208′ in depth, which best could be penetrated by an up-

o. 6 also is merely a tentative site for a shaft, so located as to develop mountain territory to the Baltic line.

e principal mine buildings and machinery, in the neighborhood of shafts 3, include a 32x45′ machine-shop, 40x60′ carpenter-shop, 25x45′ smithy x60′ warehouse. There is a 35-drill cross-compound Rand air-compressor 2 shaft, with a Deane condensing plant in a separate building adjoin- t No. 3 shaft the power plant, in a 68x180′ steel building, includes a of Stirling water-tube boilers and a 4,500′ Nordberg air-compressor, teed to run 45 drills only, but actually running 65 drills, 10 pumps and pneumatic machinery, giving a total duty equal to running 90 drills, e the rated capacity. At No. 3 there is a large coal trestle, supplying the boiler-room, and a cistern near No. 2 shaft stores water from a brook for the boilers. A house over the cistern has a fire-pump, with or defense of the mine buildings. The mine has a branch of the Copper telephone system.

e mine is served by the Painesdale branch of the Copper Range rail- hich reaches all shafts and the principal shops.

moving the old foundation, consisting of 3 tiers of 14x14" tim
entirely eliminating vibration, and under test this head has st
in 24 hours, heads having a normal capacity of about 800 tons d
ings losses, originally as high as 0.50 to 0.65%, were reduced
and, 1908, were reduced to 0.26%, by the installation of regri
settling tanks. The mill has a 300-h. p. engine, and a sma
machine-shop on the second floor.

The mill boiler-house, of steel, has six 250-h. p. and two 2
boilers, latter maintaining a steam pressure of 180 to 200 lbs.
which is the highest carried at any mill in the district. The
a brick-lined self-supporting steel smokestack, 165' high and 7'
At the rear of the boiler-house are 3 coal trestles, under ea
tunnel, 400' long, leading to the boiler-rooms, the floors of th
the roofs of the tunnels. Feed-water for boilers is piped from
dammed 1,000' distant.

The steel pump-house at the mill has a 20,000,000-gallon
taking water from a well connected with a 40" riveted steel pip
to an intake crib in Lake Superior. The crib, built of hea
braced by iron rods, is 42x56' on the bottom and 31' high, sunk
weighted with 1,800 tons of rock, and anchored into the sands
lake by heavy iron rods. The 40" intake pipe is laid on the f
from the crib until shallow water is reached, and is anchored
of the lake by eye-bolts. The 500' section of this line nearest
in a 14' trench, covered with cement, sunk in sacks, but this p
inadequate against heavy shore ice, and was replaced, 1908,
concrete covering, for a distance of 250'.

The mill buildings include a smithy and carpenter-shop, c
a 24x36' warehouse. The townsite of Beacon Hill, lying on
the mill, has a number of dwellings, and mill buildings and tow
by electricity, supplied by a dynamo in the engine-room of the

Production was begun Jan. 4, 1902, with one leased head,
mill, a second leased head being started in April. Two heads
train mill were started in 1902, and the third and fourth heads
1903. The Trimountain began production with returns of 37

)00, and it required five years to put the Trimountain back on a divi-
ds.
luction has been as follows: 9,237,051 lbs. fine copper in 1903;
0 lbs. in 1904; 10,476,462 lbs. in 1905; 9,507,933 lbs. in 1906; 8,190,711
907. In 1907 the mine hoisted 506,805 tons of rock, discarding 62,447
12.3%, and stamped 444,358 tons, which yielded 12,729,445 lbs. mineral
0,711 lbs. fine copper, an average return of 18.43 lbs. fine copper per
r 1907 working expenses were $1.96 per ton, or, including taxes, $2.06
and cost of finished copper, delivered, was 8.82 cents per pound, sold at
ige price of 17.78 cents per pound. At end of 1908 production was
00 tons of stamp-rock daily. The Trimountain, while it has proven
t disappointing, has reached a point where its future may be consid-
ired, thanks to a highly efficient and capable management.

ÑIA MINERA LA TRINIDAD. **MEXICO.**

e: care of Sr. D. José Luis Requeña, presidente, Mexico, D. F. Mine
Charcas, Moctezuma, San Luis Potosí, Mex. Luciano de la Rosa, man-
apitalization 300,000 pesos, shares 1 peso par. Lands include the San
mine, area 20 pertenencias, with an 80-meter shaft, also a mine with
ter shaft, with steam hoist. At last accounts was producing daily
ie carload of ore carrying 4 to 5% copper and 700 to 1,000 grams
r metric ton. Employs about 40 men.

AD MINING CO. **MEXICO.**

e: 710 Lankershim Bldg., Los Angeles, Cal. Mine office: La Trini-
uaripa, Sonora, Mex. D. Richardson, manager. Has auriferous and
rous copper ore, with steam power and a 50-ton mill, and is said also
a 10-ton smelter.

AD MINING & SMELTING CO. **MEXICO.**

office: Arcelia, Aldama, Guerrero, Mex. B. Davidson, mine man-
as silver-lead ores carrying gold and copper values. Property includes
a, Salvación, Sorpresa and Trinidad mines, carrying silver-lead ores,
d and copper values. Has steam power and a 20-ton mill, employing
men, at last accounts.

Y COPPER CO. **CALIFORNIA.**

e: 33 State St., Boston, Mass. Mine office: Kennett, Shasta Co.,
os. W. Lawson, president; Arnold Lawson, vice-president; Homer
secretary; Allen Arnold, treasurer; R. N. Bishop, general manager;
g officers, Louis Auerbach, Arthur P. French, Henry H. Arnold, Frank
and Kenneth K. McLaren, directors.
nized Oct. 18, 1900, under laws of New Jersey, with capitalization
0, shares $25 par. American Loan & Trust Co., Boston, transfer agent;
ional Trust Co., Boston, registrar.
ls, 1,700 acres, also a patented townsite, near Kennett, with total hold
3,233 acres, a smelter site of 422 acres, formerly owned, having been
he Mammoth. Property includes the Shasta King, which is the prin-
ie, the Lost Desert group, and the King Copper group.
Shasta King group, area 12 claims, is on the south fork of Squaw
djoining the Balaklala, 4 miles east of Iron Mountain. The mine is
n a deep gulch, topography being favorable for opening by tunnels,
e used exclusively for development. The main tunnel, 1,145′ long, is
ize, with double tram-tracks, equipped with steel ore-cars, and a 7x8′
ack tunnel has been driven 175′ vertically lower. The mine had, 1906,
00′ of workings, which have not been greatly increased since, and the
has been tested by 5,119′ of diamond-drill borings. The ore body is
claimed to be approximately 150′ wide by 1,000′ long, and of unknown
ut apparently the ore *does not* go to great depth, and it is possible

probably averages about 2.5 to 2.75% copper and 1 oz. silver small gold values. The Trinity also has an ore body of undete the opposite side of the gulch from the Shasta King.

The Shasta King mine has an incline tramway of circa 2,00 ing from the mine to the head-house of the Balaklala tramway at the mine, the tram-line having about 500 tons daily capacity.

The King Copper group, of 22 claims, on Motion Creek, c south of the Shasta King, had about 1,000′ of development wo counts, but apparently no ore had been found in place.

The Statesman group has been partially explored, with a vi and developing silicious ores required for fluxing the heavy su the Shasta King mine.

The Uncle Sam group, held under bond and lease, also has for fluxing ores, the Shasta King having large bodies of low pyrites, but lacking the silicious ores required to make free-su mixtures. The Uncle Sam group shows some oxidized ore, at an of 3 to 8% copper tenor.

Equipment includes a steam plant, with a 6-drill air-c power drills, and there also is a diamond drill. Buildings inc office building, assay office, warehouse, shops, hospital, and abou for employes.

The company made a bluff at building a smelter, 1901, doi ing at the time, but as the Trinity was worked mainly for the stock market, grading was discontinued, and the site so occupied by the Mammoth smelter. At the company's annual ruary, 1905, the president was authorized to build a smelter, specifications submitted by general manager Brown,'' but thi vanished into thin air, like its predecessor. If printers' ink smelters, the Trinity would have them aplenty.

Ore production was begun, Sept. 25, 1907, apparently at t tons daily, but apparently none of this ore got to the smelter, begun production again, circa October, 1908, after nearly a ye idleness, with ore shipments of approximately 150 tons daily.

The Trinity was said to have had a contract with the Bal

likely that Trinity can produce copper for much if any less than
ts per pound, and the cost may be higher.
he management of the Trinity claimed, when the shares were listed on
ston Stock Exchange, to have $745,047 cash in the treasury, and also
d to have 80,000 shares of stock in the treasury, but the first balance
made public by the company, of date Feb. 19, 1907, showed that the
y stock had disappeared mysteriously, this balance sheet giving assets
21,000 in lands, which possibly is a trifle inflated, for the reason that
ine is said to have been bought by Lawson for $165,000 and a stock
eration, and was capitalized, with the innate modesty that so distin-
s this great reformer and philanthropist, at $6,000,000, this being
n's idea of the square deal to his followers. The company's balance
of Sept. 30, 1907, showed accounts receivable of $895, and cash $40,705,
balance sheet for Sept. 30, 1908, gave cash resources of $282, with $895
ounts receivable. This seems about the Trinity's measure. The com-
s annual statements are very unsatisfactory, and no adequate explanation
en given for the disapparence of the fund originally on hand for con-
ion of a smelter. The Trinity has progressed backwards in a remarkable
r, its large cash surplus having sunk practically to the point of dis-
rance, while its 80,000 shares of treasury stock have disappeared com-
y, leaving no trace behind of the smelters promised at various times,
not only having failed to materialize, but even the hole where the first
r was to be built having disappeared also. In this connection, the Copper
ook repeats its criticism of the Boston Stock Exchange, which has lent
to Lawson's crookedness by listing this utterly rotten stock. The
n Stock Exchange generously permitted Lawson to list the balance of
shares of Trinity stock, early 1905.
a the prospectus of the Trinity Copper Co., issued Oct. 20, 1900, Lawson
ted that from August, 1901, the net earnings would be "at least"
,000 or $3,000,000 yearly, and by that time "at least" $30,000,000 worth
would be blocked out. These predictions have proven as accurate and
ful as others from the same source. When Lawson put out this stock
ve a personal "guarantee" that the stock would not sell below $25, but
declined repeatedly to a mere fraction of this figure. Lawson stated,
advertisement, Jan. 17, 1907, that he had always kept the finances of
rinity in the hands of others, and never, directly or indirectly, had the
ing of them. This is important, if true.
rnold Lawson was elected a director before he was a shareholder, and
W. Lawson, philanthropical promoter-president, was on record, at the
l meeting, 1907, as the owner of only 200 shares, which shows the
us Lawson to be a very wise personage, as he unloaded, shortly before,
investors," throughout the country, at prices as high as $44 per share.
o show what an utterly conscienceless scoundrel Lawson is, the following
rous suggestion is taken from one of his advertisement, of February,
referring to Mr. C. W. Barron of the Boston News Bureau. "In such
se the law can or will do nothing. If it were not for the law, this
would meet its death as does a skulking hyena. Some day following
er caused by Boston News Bureau—disaster like that of Saturday, for
ce—some victim less considerate perhaps than I, will kill this power
would kill a mad cur." The offense of the Boston News Bureau and
blisher consisted of telling the truth about Trinity. Fortunately no
-brained fool followed the hint, so murder was not done—no thanks to
n, the "reformer."
he Trinity is Lawson's scientific little game for parting fools from
money, and it has been worked, very cleverly, with the assistance of

the Boston Stock Exchange, which is an accessory after the fact. T
should be taken off the Boston exchange, and turned over to the Bo
which Lawson "reorganized" in 1908. Lawson saw fit to attack th
Handbook and its publisher in one of his advertisements, January,
was promptly called a liar and a bluffer, in a counter-advertisem
notified to bring suit, if he dared, but, in preference, shut up, wh
evidence that Lawson, whatever he may be, is not a fool.

TRIUMPH GOLD-COPPER CONSOLIDATED SMELTING, A
LAND & IRRIGATION CO.

Dead. Was a fraud, promoted by the notorious Wm. F. Werus
swindlers. Formerly at Pima, Graham Co., Ariz.

TRIUMPH TUNNEL SITE CO. A

Office: El Paso, Tex. Mine office: Safford, Graham Co., Ari
McEniry, president. Organized 1899, with capitalization $50,000. I
claimed to be 4,800 acres. Prospectus of this company is one of t
ever issued, being full of deliberate lies, and the company cannot be
otherwise than as an intentional swindle.

TROUGH-GULLY COPPER SYNDICATE CO., LTD. AUS

Office: 46 Dame St., Dublin, Ireland. Mine office: Tamworth,
Australia. Sir. E. Cochrane, Rev. J. Robinson, J. Mulligan and W. I
directors. Organized Jan. 8, 1908, under laws of Ireland, with capi
£17,000, shares £1 par.

TROUT CREEK COPPER MINING CO.

Dead. Formerly had an office at 317 Fidelity Bldg., Tacoma, W

TROY CONSOLIDATED MINING CO. A

Office: 25 Broadway, New York, N. Y. Mine office: Troy, I
Ariz. Works office: Florence, Frémont Co., Colo. Hon. A. B. Lew
dent. Capitalization $4,000,000, shares $10 par. Is practically a re
tion of the Troy-Manhattan Copper Co., though latter retains it
existence, and holds 160,000 shares of Troy Consolidated. Present co
said to have furnished a working capital of $750,000, which is dou

Lands, 50 claims, area circa 1,000 acres, 6 miles northeast of K
7 miles from a railroad. Mine has about 6 miles of openings, includ
7,000′ of tunnels, the Alice tunnel being circa 1,700′ long, with back
800′. Has 4 shafts, including a 500′ two-compartment main worki
Ores in upper workings are slightly auriferous and argentiferous ox
ceeded by sulphide ores claimed to range 8 to 16% in copper te
small gold and silver values. Vein is 3′ to 11′ in width, and wide
bottom working, where it is very soft, requiring spilling. The 40
shaft shows a 6′ body of sulphide ore, said to average about 5.5% cop
375′ two-compartment Buckeye shaft has a 5′ ore body, with a 2′ p
carrying 9% copper, and the Buckeye winze is claimed to show a
of malachite, giving smelter returns of 6 to 10% copper, which
probably are excessive. The '91 claim has a 2′ to 8′ vein of wulfe
which a 40-ton concentrator was built, near the Davis shaft, but
body apparently did not prove of commercial value. About $750,000
expended on the property, by various managements and under vario
izations, but it does not seem proven that large and permanent or
have been developed. Mining equipment includes 2 gasoline hoists,
air-compressor and an electric plant, petroleum being used for fuel.

The old smelter, of 60 tons daily capacity, at Riverside, on the Gi
was blown in 1901, and closed permanently, August, 1904, never runn
larly, and experiencing much trouble from shortage of both coke an
A new smelter, blown in January, 1905, ran 10 days, closing ostens
account of a washout, preventing the receipt of fuel, but in all l

melters did not run regularly because lacking an adequate ore supply. Rocky Mountain smelter of the Colorado Smelting & Refining Co., at nce, Colorado, bought late 1907, was rated at 500 tons daily capacity, ins been idle since circa 1902, and apparently never was a success. er is said to have been bought for $400,000, and apparently management ed shipping ore from Arizona to Colorado, for reduction, which seems an f doubtful value. Suspended operations October, 1907. Results from mine, various managements and ownerships, have been distinctly disappointing.

Y COPPER CO. **ARIZONA.**

Dead. Merged, 1902, in Troy-Manhattan Copper Co. Formerly at Troy, Co., Ariz.

Y GOLD MINING CO. **COLORADO.**

Dead. Formerly at Granite, Chaffee Co., Colo. Described Vol. VI.

Y-MANHATTAN COPPER CO. **ARIZONA.**

Office: 25 Broadway, New York, N. Y. Is practically out of business, g transferred its property at Troy, Pinal county, Arizona, 1907, to the Consolidated Mining Co., for a stock interest of 160,000 shares in the -named corporation. Fully described Vol. VI.

E BLUE COPPER MINES, LTD. **BRITISH COLUMBIA.**

Dead. Formerly at Ainsworth, Slocan district, B. C.

E BLUE MINE. **AUSTRALIA.**

Mine office: Stanthorpe, Queensland, Australia. Lenox & Rannie, owners. has a vein of 8′ to 15′ width, carrying considerable ore assaying 17.12% er and 33 oz. silver, which is shipped for smelting, low-grade ore being ntrated at an adjoining mill and shipped to London. Production, 1906, 112,000 lbs. fine copper and 1,767 oz. silver.

RO MINING & REDUCTION CO. **MONTANA.**

Office: Cleveland, Ohio. Mine office: Basin, Jefferson Co., Mont. Lands, n as the Buckeye Mine, have a 170′ shaft, with about 600′ of workings, ing ore giving fair assay values in lead, copper, silver and gold. Has m power, a small saw-mill and a 50-ton concentrator.

BOI MINE. **JAPAN.**

Mine office: Tsuboi-mura, Kume-gori, Mimasaka, Japan. *Ore is chal*rite, associated with iron pyrites, said to average 13% copper and 0.2% r, occurring in three principal veins of 2′ to 4′ width, running parallel lane of stratification of paleozoic clay-slate and schalkstein. *Production* 218,808 lbs. fine copper in 1903, and 354,875 lbs. copper and 3,208,835 me silver in 1907.

NATORI MINE. **JAPAN.**

Mine office: Yokokawame-mura, Waka-gori, Bikuchu, Japan. *Production* 309,063 lbs. fine copper in 1903, and 216,844 lbs. in 1906.

AL-CAIN COPPER & MANGANESE MINING CO. **WASHINGTON.**

Office: 211 Coleman Blk., Seattle, Wash. Mine office: *Port Townsend,* rson Co., Wash. Frank Hanford, president and treasurer; Victor R. Tull, ral manager; I. A. Nadeau, secretary; S. Marpel, superintendent. Lands, laims, 1 fractional, 18 miles from a railroad, in the Olympic Mountains, g a 1,800′ tunnel, planned to cut 5 veins of auriferous copper ore, said rry fair values in both copper and gold.

IEN-GESELLSCHAFT TURALKAIN. **GERMANY.**

Mine office: Adenau, Rheinprovinz, Germany. *Has ores of copper, lead* iron. Idle several years.

UTAMA MINING & REDUCTION CO. **MEXICO.**

Mine office: Tubutama, Altar, Sonora, Mex. Lands, 300 pertenencias, ding antiguas, adjoining the Sonora Mining & Milling Co. Idle several s.

Masonic, Bolello, Gold Hill, Purcell and Black Dyke. The Ol
from the Old Peublo Mining & Milling Co., under an optio
Tucson Consolidated is to have 51% of stock of the Old Pueb
of $150,000 worth of work. The Old Pueblo is separately d
included in present company's landed holdings. Property as a
the Old Pueblo, shows 3 ore bodies under development, of 3
width, giving ores assaying 6 to 30% copper, 12 to 80% le
silver and 80 cents to $30 gold per ton, from azurite, malac
chalcopyrite and galena, property as a whole having tunnels
287', and 12 shafts of 45' to 210' depth, with a total of about
ings, estimated by company to show 2,000,000 tons of ore, w
blocked out for stoping, which estimate seems excessive. Pr
ment is on the Old Pueblo group, separately described. The
is near the Old Pueblo, circa 6 miles west of Tucson. The P
claims, has a 100' tunnel and several shafts of 25' to 60' dep
said to give average assays of about 25% copper, with about
ings, said to put in sight 500,000 tons of ore, which is an ex
that will assay 5% copper, 5 to 40 oz. silver and 8 cents to
with some silver-lead ores. The Black Dyke group, 48 claims,
has several shafts of circa 50' depth, showing copper ore of
and lead ore assaying up to 69% lead and 139 oz. silver per t
group, 9 claims, shows 3 copper veins and has a 60' shaft, car
ing up to 24% copper, with gold and silver values.

Equipment includes a 250-h. p. steam plant, with 2 hoists.
including 2 stores. Fuel is petroleum. Made an initial shi
1907, of ore carrying 10 to 12% copper and $5 to $10 combined
values per ton. Employs circa 20 men. Property considered
management apparently business-like and vigorous, though i
excessive claims.

TUCSON-GLOBE COPPER CO.

Dead. Former office was at Tucson, Ariz. Property wa
and Westbrook claims, near the Gibson mine, west of Glob
Globe, Gila Co., Ariz.

TULAROSA COPPER CO.

ng carbonates and a little native copper. Mine has shafts of 60', 50' and ith about 800' of workings, estimated to show 500,000 tons of ore. Has and water power, with 10 mine buildings.
ill, 65x70', has an 8x14" Blake crusher, 1 Harz jig and 2 Wilfley tables. hand-sorted, selected smelter ore ranging up to 50% in copper tenor, e of low-grade being milled, mill putting about 15 into 1 and producing y average of about 1 ton of concentrates carrying 42.4% copper and 45 oz. silver per ton. Average tenor of ore is reported by company to , but will perhaps show an average for concentrating ores of about 4% , 2 to 3 oz. silver and 0.02 to 0.03 oz. gold per ton. Company plans ng a much larger mill, and opening mines more extensively, but is going lly, in preference to going into debt, which is a wise course. Mine ered promising, and management regarded favorably.

ROSA MINING & MILLING CO. **NEW MEXICO.**

ead. Succeeded March 5, 1905, by Tularosa Copper Co. Formerly at Otero Co., N. M.

TULIPAN. **CHILE.**

line office: Chañaral, Atacama, Chile. Zoilo Rojas, owner; R. Olquin, ntendent. Has steam power.

OCK GOLD & COPPER CO. **NEW MEXICO.**

ffice and mine: Silver City, Grant Co., N. M. Organized 1907. Lands, ims, area, 300 acres, on Edith Mountain, in the White Signal district, g a 50' shaft on the Dagger Point claim, showing ore said to average 14% copper.

Y COPPER MINING CO. **COLORADO.**

ffice: Encampment, Wyo. Mine office: Pearl, Larimer Co., Colo. F. J. er, president; H. B. Lordier, president; H. B. Ashley, secretary; B. A. , treasurer; J. D. Tully, superintendent. Organized 1901, under laws of ing, with capitalization $1,000,000, shares $1 par. Lands, 12 acres, ented, also a 6-acre millsite, showing 6 fissure veins, carrying oxidized of which one, opened by a 175' shaft, is said to show a 25' vein, carrying ge values of 6% copper and $4 gold per ton. Property, which is unpat- , is mortgaged for $1,500, raised to perform assessment work. Company ently in a bad way.

-TUM GOLD & COPPER MINING CO. **WASHINGTON.**

Office: 1017 Scarritt Bldg., Kansas City, Mo. Jas. H. Clark, fiscal agent. any claims to own 10 claims, area 200 acres, in the southwestern part of ington, 60 miles in an air-line from Portland, Ore. Presumably idle.

WATER COPPER MINING CO. **WASHINGTON.**

Office: Minneapolis, Minn. Mine office: Leavenworth, Chelan Co., Wash. y Jejeski, president; J. Cermak, vice-president; Francis Hrahovsky, treas- Andrew Jejeski, secretary; John Sadoske, superintendent. Organized under laws of Washington, with capitalization $500,000, shares $1 par.

PAÑIA MINERA DE TUNILLAS. **CHILE.**

Office: Santiago de Chile. Mine office: Tunillas, Coquimbo, Chile. Or- ed Apr. 18, 1906, under laws of Chile, with capitalization 600,000 pesos, s 50 pesos par.

LUMNE COPPER MINING CO. **MONTANA.**

Office and mine: Butte, Silver Bow Co., Mont. Edw. Hickey, president; Bielenberg, vice-president; J. J. Harrington, secretary; John W. Pratt, urer; Patrick Sheehan, general manager. Organized May 24, 1906, under of Arizona, with capitalization $800,000, shares $1 par. Shares are listed e Butte Stock Exchange.

Lands, one fractional claim, area 6 acres, being small but well located, between *the Speculator and Jessie claims*, two of the best mines of the

North Butte. Title is by deed, and propert
three-compartment shaft, planned to be dee
and crosscuts, latter showing 3 veins, on
width, carrying very low grade copper ore,
ore of 3 to 7% copper tenor. Company is
plant, with hoist good for 3,000' depth, pre
of its capacity. The Tuolumne is one of the
during the 1906-1907 boom, to continue d
depression, employing about 35 men. No
been developed by the end of 1908, but wo
ing, indicates that ores of good grade should
Property considered promising.

TURNBULL DEVELOPMENT CO.

Office and mine: Globe, Gila Co., Ariz
laws of Arizona, with capitalization $500,0
H. N. Pascoe, G. W. Jones and Geo. R. Hi
vein of slightly auriferous and argentiferou
Mine also has a 400' tunnel.

TURGOVSKI WORKS.

Mine and works office: Perm, Russia.
duction, 1900, as per official Russian figure
unofficial returns of output for 1902 were

TURK MINING & MILLING CO.

Office: Davenport, Wash. Mine office:
Stiles, superintendent. Ores carry gold, co

TURNER-ELY COPPER CO.

Office: 35 Wall St., New York, N. Y.
Nev. S. Herbert Williams, manager. Ca
par. Lands, 9 claims, area 116 acres, said
dated and Cumberland-Ely.

TURNSTREAM COPPER MINING & DEV

Office: East London, Cape Colony. M
Organized circa June, 1907, under laws o
£30,000, working capital £10,000, as successo
Lands, 16 miles from Cathcart, on the Zwa
of which a 40' shaft has ore giving a gener

TURNSTREAM COPPER SYNDICATE.

Dead. Succeeded, 1907, by Turnstream
Formerly at Cathcart, Cape Colony.

TURQUOISE COPPER CO.

Mine office: Brice, Otero Co., N. M.
mine, showing turquoise and copper ore, la
cite. Shipments of hand-sorted and scree
copper. Plans a concentrator.

TURQUOISE COPPER MINING CO.

Mine office: Gleeson, Cochise Co., Ari

TUSAS PEAK GOLD & COPPER MINING

Office: 364 River St., Manistee, Mich
Co., N. M. W. J. Sibben, president; Co
Otto Rosenfeld, treasurer and resident direc
officers, Max Bowman, Jas. W. Murray, A.
Skyoeh, directors; Frank Bolton, superint
under laws of New Mexico, with capitalizati
$100,000 authorized, circa $40,000 issued.

Lands, 13 claims, area 230 acres, an

ict, circa 14 miles west of Tres Piedras, and 10 miles from a railroad. ipal development is on the Tampa mine, having a 13′ vein of auriferous argentiferous copper ore, with a 5′ paystreak said to average 7.5% copper, ace of ore being of concentrating grade. The Tampa has shafts of 80′, nd 425′, with about one-half mile of workings, showing ore reported by any to assay 5 to 44% copper, 1 to 4.5 oz. silver and $1.20 to $3.80 gold on, with some ores assaying up to 2.3 oz. platinum per ton, and with more ss molybdenum. Has a hydraulic ram on Tusas Creek, 3-drill air-compor and a small sawmill. Has a 40-ton leaching plant, with Wild mills, leted 1907, planned to treat oxidized ores. Presumably idle.

NTIETH CENTURY ALASKA COPPER CO. **ALASKA & WASHINGTON.**

Mine office: Valdez, Alaska. Letter returned unclaimed from former office, Index, Snohomish Co., Wash. W. N. Robeson, business manager; on C. Hubbart, superintendent. Lands include claims in Alaska, and the nning mine, 9 claims, 2 miles north of the Sunset, supposed to carry the nsion of the Ethel vein, at Index, having a 400′ tunnel and a 650′ aërial . The Index property is idle, as presumably is the Valdez property also.

NTIETH CENTURY GOLD MINING CO., LTD. **ARIZONA & ONTARIO.**

Dead. A swindle that paid dividends while selling stock. Formerly in Rainy River district of Ontario and in Cochise county, Arizona. Deed Vol. VI.

NTIETH CENTURY KNIGHTS ISLAND COPPER CO. **ALASKA.**

Mine office: Valdez, Alaska. Lands, 8 claims, on Dryer Bay, adjoining the ghts Island Copper Co.

N BUTTES MINING & SMELTING CO. **ARIZONA.**

Office: 121 Wisconsin St., Milwaukee, Wis. Operating office: Tucson, . Mine office: Twin Buttes, Pima Co., Ariz. Edw. T. Davis, president; uel D. Adler, first vice-president; W. A. Barber, second vice-president; . Blakeley, secretary; Edw. P. Hackett, treasurer; preceding officers, W. H. es, Felix Isman and J. G. Baxter, directors; Capt. Wm. McDermott, mine rintendent; David L. Stinson, railroad superintendent.

Organized Sept. 8, 1903, under laws of Arizona, with capitalization 00,000, increased, 1905, to $1,250,000, shares $1 par. Bonds outstanding, ,000. Controls, through stock ownership, the Twin Buttes Railroad Co. consin Trust Co., transfer agent and registrar. Annual meeting, first day in January.

Lands, 61 claims, partly patented, area 1,250 acres, in the Helvetia dis-, in the foothills of the Sierrita Mountains. Property, opened 1880, was ccessful under former ownership, owing to lack of cash and management, gh always considered promising. Lands are reported to carry fissure veins mestone, and contact deposits between limestone and granite, with lime- foot and granite-porphyry hanging. The various properties of the com- had about a mile of workings, 1906, estimated to show 50,000 tons of ore ked out for stoping, averaging circa 7% copper and 1.85 oz. silver, with s of gold.

The Senator Morgan mine has a 7x16′ three-compartment shaft, of circa depth, said to show a vein of 25′ average width, carrying sulphide ore of 10% copper tenor in the bottom workings, but ore probably is not so rich timated. The Morgan shaft has railroad connections.

The Copper Glance mine has a 415′ shaft, sunk on an ore body having a gossan, succeeded by about 200′ of carbonate ore, and, on the 300′ level, a cut has passed through 35′ of marcasite carrying kidneys of chalcocite, a crosscut on the 400′ level encountered a promising ledge of soft leached

The Copper King mine has a 200′ shaft, developing carbonate ore upper workings, and sulphides in the bottom, the showing being co promising.

Equipment includes a 300-h. p. steam plant, burning wood and p at the Morgan mine, with a 125-h. p. Leyner double-drum hoist, rais loads, and a 10-drill Leyner compound air-compressor. There is a plant at the Copper King mine.

Buildings, 14 in number, include a power-house, machine-shop, sm store.

The Twin Buttes railroad, 27 miles in length, running from Tw to Tucson, completed July, 1906, has one locomotive and 3 flat-cars.

The matter of building a smelter was given tentative conside 1907. Water for a smelting plant can be secured from the Santa Cru miles distant.

Production was 700,329 lbs. fine copper and 11,294 oz. silver, in was 94,056 lbs. copper and 342 oz. silver, in 1907. In August, 1907, was shipping circa 50 tons daily, but suspended operations a few we resuming shipments, 1908, on the basis of 8 carloads weekly, to El Pas Property considered promising, but apparently is suffering from lac quate capital.

TWIN CITY DEVELOPMENT CO. CO

Dead. Formerly at Turret, Chaffee Co., Colo. Described Vol. V

TWIN-EDWARDS COPPER MINE CO. NORTH CA

Office and mine: Greensboro, Guilford Co., N. C. Organized S 1902, with capitalization $100,000, shares $100 par. Lands are s properties, including the Twin mine, with an 18′ vein, which was w vious to the American Civil War. Idle several years.

TWIN KINGS MINING CO.

Office: 826 Wells Bldg., Milwaukee, Wis. Mine office: Cupri alda Co., Nev. A. F. Heidkamp, president; Elbert Oldt, general Capitalization $1,250,000, shares $1 par. Lands, 4 claims, 3 miles fro and 12 miles south of Goldfield, having a vein of 5′ to 10′ width, mainly oxidized surface ores, with a little chalcopyrite, opened by se cuts, and 2 shafts of circa 70′ each, said to give ore assaying 25 to 45 20 to 40 oz. silver and $20 to $40 gold per ton. Advertising of Koe & Co., of Milwaukee, fiscal agents, was entirely too promissory. P idle.

TWISP GOLD-COPPER MINING CO. WASH

Office: care of Frank R. Creighton, manager, Spokane, Was returned unclaimed from former mine office, Twisp, Okanogan C Lands, known as the Index group, circa 20 miles north of Twisp, a developed by tunnel, showing a little low grade copper ore. Idle.

TWO LAKES COPPER MINING CO., LTD.

Office and mine: Sowerby, Algoma, Ont. Organized Oct. 12, 1 laws of Ontario, with capitalization $500,000.

TWO QUEENS MINE.

Owned by Central Mining & Development Co.

TWO REPUBLICS MINING CO.

Office and mine: Jerome, Yavapai Co., Ariz. R. A. Smith, John B. Lecorr, vice-president; Paul Smyly, secretary and treasur Dixon, manager. Organized 1908, under laws of Arizona, with cap $1,000,000, shares $1 par. Lands, circa 10 miles from Jerome, have planned to be driven 700′.

TYEE COPPER CO., LTD. BRITISH CO

Office: 45 Leadenhall St., London, E. C., Eng. Operating offic

rade Bldg., Victoria, B. C. Mine office: Duncans, Vancouver Island, B. C. s office: Ladysmith, Vancouver Island, B. C. Thos. Headland Wilson, man; preceding officer, Nicol Brown, Harry von Berg, Albert Straube and dwig Loeffler, directors; Wm. Gardner, secretary; W. H. Trewartha-James, al manager; J. W. Bryant, superintendent; W. J. Watson, smelter super- dent; W. M. Brewer, ore purchaser.

Organized Apr. 4, 1900, under laws of Great Britain, with capitalization ,000, shares £1 par. Dividends were 10% in 1904; 10% in 1905; 5% in and 7½% in 1907. At end of fiscal year, Apr. 30, 1908, the company had 95 19s. invested in selected bonds and stocks of exceptional solidity, and s, for year ending Apr. 30, 1907, were £22,506.

Lands, 13 claims, crown-granted, area 342 acres, also a 45-acre smelter 60-acre tramway terminal and 800 acres timber lands, all in the Somenos ct, on Mount Sicker, circa 11 miles northwest of Duncans, and about 80 from Vancouver.

The Tyee mine shows schists carrying up to 2% copper, with small gold ilver values, suitable for fluxing, and lenses, in banded schists, of chal- ite, with barite gangue, averaging 4% copper, 2.5 oz. silver and $3 gold n, with about 7% zinc and circa 38% barium sulphate, rendering the ore tory in smelting. The main shaft, of circa 1,000′ depth, encountered no f importance below the 300′ level, though the mine was tested, systemat- , to a depth of circa 1,200′, by drifts, crosscuts and borings by 2 diamond . The north lode of the Tyee, on the I. X. L. claim, adjoining the Tyee, 500′ shaft. No. 2 shaft is circa 200′ in depth.

Mining equipment includes a 10x40″ link-motion hoist, with two 4′ drums, ting safety cages, with smaller hoists of 20 h. p. and 50 h. p., also 5-drill 0-drill air-compressors and a pumping plant capable of raising 100,000 s daily, in a single lift of 1,000′. There also is a sawmill at the mine.

Buildings at the mines include an engine-house, boiler-house, smithy, car- r-shop, store, boarding-house and bunkhouse.

The concentrator, at the main shaft, has a No. 4 Gates crusher, Blake er, grizzley, rolls, grinders, Snyder automatic samplers and an ore-sorting ore being delivered from the sorting belt to 100-ton bunkers.

Ore is taken from the bunkers by a 3½-mile aërial tram, having half-ton ts, operated by a 4-h. p. engine, for starting, gravity furnishing the e power, there being a drop of 2,000′ between the mine and the 400-ton nkers at the lower terminus of the line, on the Esquimault & Nanaimo ay. From the lower bunkers, ore is carried 17 miles, by rail, to the er, in 30-ton bottom-dumping cars.

The smelter is well located, on a 45-acre site on Oyster Harbor, where is a 40x210′ wharf, connected by an elevated incline trestle with the er-bins. Considerable improvements were made, 1907-1908, on these works, cost of circa £20,000. A notable feature of this plant is the roast-yard, h is fully described in the chapter on Pyrometallurgy of Copper, in this ne.

The smelting plant, terraced throughout, to permit handling of material ravity, has a 56x81′ wooden furnace building, with a 200-ton Allis-Chalmers r-jacket blast-furnace, 42x120″ at the tuyeres, using a hot blast, with room second furnace of the same size. The furnace has a water-jacket fore- h for matte, slag skimming into a settler and thence into a launder, where ulated and washed away by running water. The dust-flue, 8x11x165′, d over with corrugated iron, leads to a 90′ smokestack, of 7′ diameter. Furnace reduces 9.45 tons of ore and flux with one ton of coke. The reduc- plant also includes a complete sampling mill, briquetting plant for fines, olytic assay *plant and an electric light* plant. The plant does a general

custom business, handling ores from British C
sells its product, as a 50% matte, to Americ
works.

Production of the mine, 1906, was 23,8
lbs. fine copper, 77,085 oz. silver and 2,776
down, 1907, yielding in that year only 1,200
1905, was 3,039,398 lbs. fine copper, 103,474
smelter treated circa 55,000 tons of ore in
Apr. 30, 1908, was in blast 187 days, treati
long tons of coke, one ton of coke smelting
tion, for fiscal year 1908, was 3,975½ long to
18.72 oz. silver and 18 dwts. gold per ton, equi

The management of the Tyee is entitled
manner in which it has survived the exhaust
position from a mining company to a custon
tinuing substantial dividend payments.

TYRONE DEVELOPMENT CO.

Dead. Succeeded, circa May, 1907, by
Tyrone, Grant Co., N. M. Described Vol. V

TYRONE MINING CO.

Office and mine: Tyrone, Grant Co., N.
ains, were being explored by churn drill, at

TYWARNHAILE SYNDICATE, LTD.

Office: 1 St. Helens Place, London, E. C
Scorrier, Cornwall, Eng. W. R. Thomas, m
secretary. Organized Sept. 19, 1907, under
struction of a company of similar name form
tion £30,000, shares £1 par; issued, £23,683.
which carries copper ore only, without the t
mines. Has a mill, using the Elmore vacuum

TZAREVO-ALEXANDROVSKI WORKS.

Office, mine and works: Semipalatinsk,
promising, though but slightly developed, yiel
of about 500,000 lbs. fine copper, at last acco

UBEHEBA COPPER CO.

Office: 544 Equitable Bldg., Baltimore
shares $1 par. Lands, sundry claims, about
in the Ubehebe Mountains, near Death Valley
show veins of 8′ to 50′ width, carrying auri
to 20% in copper tenor.

UBHEBE COPPER MINES & SMELTER CO

Office: 701 Calvert Bldg., Baltimore, M
Co., Cal. John Salisberry, president and ge
vice-president; J. J. Griffith, secretary and
manager. Lands, 50 claims, area 1,000 acre
50 miles northwest of Rhyolite, Nevada, and
station, on the Bullfrog-Goldfield road. Pro
showing of copper, has an 80′ shaft and a 14

UGURCHAISKA MINE.

Office: Batum, Russia. Kunderov Bros.,
Mine, in the government of Elizabethopol, w
accounts.

UINTAH COPPER SUMMIT CO.

Dead. Formerly at Vernal, Uintah Co., U

H MINING, MILLING & DEVELOPMENT CO. **UTAH.**
ter returned from former mine office, Bingham Canyon, Salt Lake Co., L. C. Moore, general manager; F. D. McNeill, superintendent. Is said bought the Castro group, opened by a 700′ tunnel, at Bingham Canyon, pparently is some relation to the Castro-Grecian. Idle.

H TREASURE HILL COALITION MINES CO. **UTAH.**
ce: Provo, Utah. Mine office: Park City, Summit Co., Utah. Jesse president; T. W. Bell, vice-president; W. Lester Mangum, secretary surer; preceding officers, J. William Knight and E. S. Fisher, directors; drews, superintendent. Organized 1907, under laws of Utah, with cap- on $500,000, shares 50 cents par. Lands, circa 20 claims, including the ine, formerly held by the Uintah Treasure Mining Co.

I TREASURE HILL MINING CO. **UTAH.**
d. Was organized circa July, 1907, as successor of Treasure Hill Co., and was succeeded, circa August, 1907, by Uintah Treasure Hill Mining Co. Formerly at Park City, Summit Co., Utah.

OMO MINING & MILLING CO. **WYOMING.**
e: Cheyenne, Wyo. Mine office: Leslie, Albany Co., Wyo. Lands, s, area 220 acres, 1¼ miles from the Strong Copper Mining Co., in county, Wyoming, having 2 shafts, deepest 150′, on a vein carrying us pyrite with quartz gangue having small silver and nickel values, sional free gold assaying up to $1,000 per ton. Has steam power.

CONSOLIDATED COPPER CO. **CALIFORNIA.**
e: 37 Wall St., New York, N. Y. Mine office: Lone Pine, Inyo Co., . H. Dalton, president; Henry D. Harris, secretary. Organized Novem- , under laws of Maine.

COPPER CO. **CALIFORNIA.**
e: care of Hon. Wm. H. King, Salt Lake City, Utah. Mine office: ne, Inyo Co., Cal. Chas. McRoberts, superintendent. Organized circa 1907, under laws of Maine, with capitalization, $5,000,000. Lands, , in the Ubehebe district, some distance from transportation, showing act vein between limestone and granite, carrying argentiferous melac- l occasional cuprite, giving assays of 14% copper and $3 to $10 gold Development is by tunnel, and under former ownership mine made mall shipments of hand-selected ore of high copper tenor.

EP COPPER MINING & MILLING CO. **COLORADO.**
e office: Grand Junction, Mesa Co., Colo. Jas. V. Howard, secretary. d under laws of Colorado, with capitalization $500,000, shares $1 par. claims and a millsite, in the Unaweep district, slightly developed. eral years and presumably moribund.

SAM CONSOLIDATED MINING CO. **UTAH.**
e: 516 Dooly Blk., Salt Lake City, Utah. Mine office: Eureka, Juab n. John Dern, general manager; preceding officer, Jas. Chipman, Geo. mp, B. S. Saunders and Jas. Nelson, directors; C. C. Griggs, super- t. Organized June 29, 1901, under laws of Utah, with capitalization shares $1 par. Owns 400,000 shares, being one-half of the capitaliza- May Day Mining & Milling Co. Report at annual meeting, June 1, preceding fiscal year, showed gross earnings of $135,455. Was paying dividends of 2 cents per share, to August 1907.
ls include the Humbug mine and a four-fifths interest in the Rich- d Aanaconda claims, adjoining the Humbug. Mine produces mainly s silver-lead ore, of both smelting and milling grades, but has some nd copper carbonates ranging 12 to 33% in copp Has steam *d a concentrator. Production, 1907,* was 185 carlo

UNCLE SAM COPPER CO. AL

Office: 1237-25 Broad St., New York, N. Y. Mine office: Ket Alaska. Is said to be controlled by Alaska Mines Securities Co., throug ownership, secured May, 1906. Lands, 3 miles from the Hadley, sho vein, traceable 1,200', carrying auriferous and argentiferous copper ore average tenor. Property has necessary mining buildings, and a 1,150' leading from the mine to a wharf on tidewater.

UNCLE SAM COPPER CO. A

Dead. Formerly at Gilbert, Yavapai Co., Ariz. Fully described

UNDERLAY MINE. AUS

Mine office: Dandaloo, New South Wales, Australia. Lands, miles west of Dandaloo, adjoin the Mount Royal mine, showing carrying high-grade oxide, carbonate and sulphide ores, ranging in copper tenor. Presumably idle.

UNIDA GOLD & COPPER MINING CO.

Mine office: Wickenburg, Maricopa Co., Ariz. Geo. Margaretic and general manager; Geo. Palda, secretary. Lands, in the Black Ro have a 300' shaft and tunnels of 200' and 300', showing ore carryin and copper values. Has steam power and shipped, 1907, several good ore.

COMPAÑIA MINERA LA UNIÓN.

Mine office: Viesca, Coahuila, Mex. Property is El Esfuerzo ing copper ores.

UNION CONSOLIDATED COPPER MINES, N. L. SOUTH AU

Offices: Collins St., Melbourne, Australia, and 8 Broad S London, E. C., Eng. Mine office: Umberatana, Lyndhurst, Soutl E. Lowenstein, chairman; A. J. Miller, managing director; Arth London secretary; W. B. Greenwood, engineer; A. G. Sarjeant, mi Organized Dec. 23, 1904, under laws of Victoria, with capitalizati shares £1 par. Owns a share interest in the Lyndhurst (South Copper Co., Ltd.

Lands, 440 acres, in the Yudnamutana district, circa 70 miles ea hurst, the nearest railroad point, and 400 miles north of Adelaide, number of old mines that have been failures in the past, on wh mining was done and an old smelter built many years ago. Lan what is known as No. 6 lode were set off as the Lyndhurst (South Copper Co., Ltd. Lands include the Daly mine, showing 5 veins, opened to a depth of about 100' only. No. 5 vein, which apparently one of much importance, is claimed to average 400' in width, tr miles, and to carry ore averaging 4 to 5% copper. Apparently the wi exceed 200' and vein is traceable about one-half mile only, instead that length. No. 5 lode is said to give oxide, carbonate and s assaying 60% copper and 8 dwts. gold per long ton, these assays obv from carefully selected samples. No. 5 lode apparently is claim pany to be a 4% proposition. Company claims the biggest surfa in Australia, which claim seems utterly unwarranted, and clai upwards of 3,000,000 tons of ore in sight, in No. 5 vein, which i impossible, in view of the limited workings. Company's chairma conviction that the lands were sufficient for at least 5 big copper m was merely a wild guess. No. 5 lode was worked, circa 1890, and p the Australians call a duffer. Company made much of the fact th mania Copper Co. was building a smelter in the district, and clai a smelting contract therewith for the treatment of 1,000 tons of at 35s. per ton, price to be reduced to 32s. 6d. when production re tons weekly, but apparently the Tasmanian Copper Co. has practi

ines in the Yudnamutana district, and its Blinman smelter as well. ls of ore, sent to smelter for tests, are said to have given average 27.7%, but such tests are important, or otherwise, according to s are selected to give an average, or to furnish high returns. Com- ently is averse to examination of its workings by other than its d is regarded with suspicion

IÓN y CONSTANCIA. **MEXICO.**

ad mines: Indé, Durango, Mex. Reinaldo E. Avila, general man- s were opened in the Sixteenth Century. Country rock is andesite, re bodies, carrying chalcopyrite, galena and sphalerite, associated . Ore body under development averages 2 meters width and is shaft of 18m. and by tunnels of 70m. and 100m., developing first- veraging 43% lead, 100 oz. silver and 54 oz. gold per metric ton, grade ore averaging 4% copper and 20 oz. silver per ton, latter ttle native copper. Smelter, 4 miles from the mine, has two 30-ton blast-furnaces, shipping matte to the Aguascalientes works of n Smelting & Refining Co., for conversion and refining.

PPER CO. **ARIZONA.**

care of S. G. Reading, president, Williamsport, Pa. Mine office: Co., Ariz. W. F. Anthony, vice-president; F. L. Toombs, secretary r. Organized Oct. 31, 1906, under laws of Arizona, with capitaliza- 00. Lands include the Chapparal, Sieboth and Halliday groups, al group, 13 claims, being circa 2 miles northwest of the Gibson, liday group, 4 claims, lying between the Gibson and Central. Pre-

PPER LAND & MINING CO. **MICHIGAN.**

825-60 State St., Boston, Mass. Mine office: Houghton, Houghton H. F. Fay, president; Geo. G. Endicott, secretary and treasurer; icers, John C. Watson, Stephen R. Dow, Walter L. Frost and Capt. eth, directors; J. Abner Sherman, land agent.

ed 1863, and reincorporated 1893, under laws of Michigan, with u $2,500,000, shares $25 par; issued, $2,000,000. Company begun balance of $88,368.98, paying therefrom, Feb. 10, 1908, a $40,000 ld Colony Trust Co., Boston, registrar. Annual meeting, fourth March.

Jan. 1, 1908, were 5,323 acres, also 1,043 acres of mineral rights, 0 different parcels. Practically all of the company's holdings are enawan copper belt, in Keweenaw, Houghton and Ontonagon coun- n, much of the land being covered with valuable timber, includ- lock and hardwood, mainly the latter.

PER MINES CO. **NORTH CAROLINA.**

42 Broadway, New York, N. Y. Mine office: Gold Hill, Rowan hos. C Buck, Jr., chairman; Capt. H. L. Griswold, superintendent. 907, under laws of Maine, with capitalization $2,500,000, shares ccessor of Union Copper Mining Co., bankrupt, one share of new given for two of old.

circa 1,150 acres, about 15 miles from Salisbury, in Rowan and nties, well watered and timbered, showing 5 veins, 3 carrying one each silver and gold, the gold and silver veins being but eloped. Principal development is on the Big Cut copper vein, distance of about one mile, by 10 shafts, of 150' to 900' depth. of old workings were claimed to show a vein of 20' to 40' width, ently should be 15' to 30', carrying oxidized ores and a little r. The lower levels open a vein of 8' to 16' width, with slate walls, lcopyrite *with quartz gangue*, claimed by former company to aver-

age 10% copper, 3 to 30 oz. silver and $1.50
sampling, by Dr. A. R. LeDoux, gave averag
and 40 cents to $1.20 gold per ton. Ore occ
and chutes, longest about 100′ in length. N
4″ wide at surface, and 3′ to 4′ wide on th
copper.

The machinery plant is extensive, but
27 boilers, 18 hoists, 3 air-compressors and
pressor has been sold and replaced by a n
pressor. Buildings include a 45x70′ machin
and brass foundry, engine-house, boiler-hou
130 dwellings and a stable for 400 horses a

The reduction plant includes a concer
roasters and two 40-ton blast-furnaces, blo
out June, 1902. Present company is said
badly muddled by management of former c
erty with a view mainly to the stock mark
and concentrates shipped, since 1902.
worked in North Carolina instead of in the

UNION COPPER MINING CO.

Office: care of Estate of Fredk. L.
Copperopolis, Calaveras Co., Cal. David R
is owned by the Ames Estate.

Lands include the Union, Keystone an
joining the Alto, in Del Norte county, Cal
considerable producers, paying fair divide
a black pyritous slate, in amphibolite schist
county, on the south, through Calaveras i
The slate is 33′ to 40′ wide, with strike of
East. Ore occurs as lenses of 15′ average
lense being 2′ to 40′ wide and 600′ long. Th
only, carries rich oxides and carbonates, an
occurs chalcopyrite, carrying neither gold
arsenic, antimony, bismuth and other un
therefrom making good wire-bars, without
classified as smelting ore of 10 to 11% copp
ing 5 to 5.5% copper.

Main shaft, 60′, is bottomed in a 15′
mine has a mile of openings in ore. Equi
with necessary mine buildings. Has a 100
Operations confined, for many years, to pro
old dumps, which are extensive. Old work
90′ steel gallows frame built over main shaft
Has survey made for a 12-mile railway, to
Milton. Mine closed down, June, 1907.

UNION COPPER MINING CO.

Dead. Succeeded, 1907, by Union Cop
Hill, Rowan Co., N. C. Fully described Vol

UNION COPPER MINING CO.

Dead. Formerly at Encampment, Carb

UNION COPPER SMELTER CO.

Dead. Property was an imaginary sm
imaginary mines. Formerly at Pima, Grah

UNION COPPER SMELTING CO.

Dead. Same as Union Copper Smelt

'm. F. Wernse gang, of St. Louis. Formerly at Pima, Graham Co.,

VELOPMENT CO. **CALIFORNIA.**

returned unclaimed from former office, Boston, Mass. Mine office: g, Kern Co., Cal. Property was the Juanita claim, in the Morrow miles east of Johannesburg, showing a contact vein, between limestone, carrying auriferous chalcopyrite, with talcose gangue, shafts, deepest 212'. Idle some years and presumably moribund.

NE. **MICHIGAN.**

care of Calumet & Hecla Mining Co., Calumet, Mich. Mine office: Ontonagon Co., Mich. Jas. MacNaughton, general manager; Thos. superintendent. Property, first known as the Isle Royale & Lake is the first mine opened in the Porcupine Mountains. Old company zed October, 1864, under laws of Michigan, with capitalization d presumably has been wound up. Mine has 4 shafts, of 85' to 400' 4 levels opened, on an amygdaloidal bed lying north of the None- and once had a small stamp-mill with Frue vanners. Was un- bruary, 1908, by the Calumet & Hecla, which holds an option on .

E EXTRACTION & REDUCTION CO. **COLORADO.**

Reorganized, circa 1905, as National Radium & Copper Co. For- nver, Denver Co., Colo.

ELTING CO. **ARIZONA.**

returned unclaimed from former office, Los Angeles, Cal. Mine oride, Mohave Co., Ariz. Works office: Kingman, Mohave Co., ls include the Pinkham mine. Has a semi-pyritic smelter with a ing furnace. Presumably idle.

LKALI CO., LTD. **SPAIN.**

30 James St., Liverpool, Eng. Mine office: Valverde del Camino, ain. Works office: St. Helens, Lancashire, Eng. Employs 3,000 Brock, chairman; E. K. Muspratt, vice-chairman; Eustace Carey, . H. Cresswell, general manager; C. Kaesmacher, assistant man- Hill & Stewart, consulting engineers. Organized under laws of n, with capitalization £8,750,000. Company is primarily a chemical cturing corporation, with which copper mining is merely a small he general business, and controls 46 subsidiary works and corpora- of the plants being of very great size. The company has its prin- at St. Helens, Runcorn, Flint, Widnes and Glasgow, making ex- of Spanish and Portuguese pyrites, which are burned for sulphur, the cinder remaining is leached for copper.

properties in Spain include the Sotiel Coronada and Castillo del es, which are separately described, also the Santa Rosa, Concepción, d Monte Rubio groups, all in the province of Huelva. Properties l Huelvan slates, with lenticular contact deposits between slate y, these, with a generally NW. and SE. strike, and dip of 30° to rying cupriferous pyrites.

ta Rosa group, including El Tinto mine, having a combined area res, at Zalamea la Real, Huelva, is leased from the Sociedad de las bre Tinto y Santa Rosa. The Tinto and Santa Rosa mines, with have a 9-kilometer Bleichert aërial tram to Calañas. Production, he Tinto and Santa Rosa, was 38,605 long tons of pyrites, and 803 ment copper.

nte Rubio group, held under lease from Sociedad Colectiva C. & J. cludes the Monte Rubio, Gibraltar and Atbalcal Arbalcal mines, *mbined area of circa 100 hectares*, at Palmogo, Huelva. These are

ancient properties, worked only to the level of t
Roman era, the old workings, though comparatively
mous masses of ore, occurring as oxides, sulphides
of iron ore, indicating the existence of large bodi
sulphides at greater depth. There is a 22-kilometer
to Coiña Veral, on the river Guadiana, where the
undeveloped mineral leases.

The company controls the Ferocarril Buitron, of
42" gauge, equipped with 18 locomotives, transpor
passengers.

UNITED ARIZONA COPPER CO.

Letter returned unclaimed from former office,
office: Prescott, Yavapai Co., Ariz. Lands, known
the Black Rock district, are said to show a vein of
a 100' shaft, and property has about 1,000' of work
well in copper, silver and gold. Idle and presumab

UNITED ARIZONA COPPER CO., LTD.

Office: 1 Broad Street Ave., London, E. C.,
Pinal Co., Ariz. Rt. Hon. Earl of Orford, chairma
manager; J. Francis Shearer, secretary. Organized
of Great Britain, with capitalization £200,000, shar

Lands, 500 acres, known as the Reward mine, b
ward Consolidated Mining Co., circa 6 miles from
have bought its lands for £160,000 cash, which state
was bonded, 1907, for 30 months, to Casa Grande D

UNITED BINGHAM GOLD & COPPER MINING C

Office: Salt Lake City, Utah. Mine office: B
Co., Utah. Louis Moore, president; A. Hanauer, J
man, superintendent, at last accounts. Lands, seve
developed by the Snowstorm tunnel, which has oper
of 2% copper, 25% lead and up to $8 gold per ton.

UNITED COPPER CO **IDA**

Office: 42 Broadway, New York, N. Y. Opera
and Salt Lake City, Utah. F. August Heinze, pres
vice-president; Stanley Gifford, secretary and treasu
J. Curtis, Sanford Robinson, Chester Glass, John
and Horace G. Abel, directors.

Organized Apr. 28, 1902, under laws of New
$80,000,000, shares $100 par, in $5,000,000 preferred
$75,000,000 common stock; issued, $50,000,000, in
$45,000,000 common shares. Stock is listed on the
exchanges. Metropolitan Trust Co., New York, Old
and Fidelity Title & Trust Co., Pittsburg, registr
Boston, Union Trust Co., Pittsburg, and C. S. Buckin
agents. Annual meeting, first Wednesday in June.

Preferred stock is redeemable, at $125 per sha
thereof, upon any dividend date, on 3 months' notic
has power to fix, determine and vary the disposition
time to time, the powers of the board being practi
shareholders without voice in the management, and a
for mismanagement.

The company paid $7,462,500 dividends to end o
was paid on preferred and $5,962,500 was paid on
dividends being $150,000 in 1902, $300,000 each in
and $150,000 in 1907. First dividend on comm

nds on common shares were $450,000 in 1905, $3,150,000 in 1906, and ,500 in 1907. The common stock was placed, 1906, on a quarterly divi- basis, at rate of 7% per annum, but the company was unable to maintain ate, after the depression in the metal market, followed by the panic 7.

or fiscal years ending June 1, the company's statements show income llows: $1,045,475 in 1904; $1,513,850 in 1905; $3,011,620 in 1906; 23.97 in 1908, of which $841,662.50 was from dividends on securities held, 19,361.47 from interest. President Heinze informed shareholders June, that the floating indebtedness of the company did not exceed $1,100,000. he United Copper Co. is a securities holding corporation solely, and was zed, ostensibly, along much the same lines as its former great rival, the amated Copper Co., except that the Amalgamated buys control of sub- corporations to retain, while the United is operated as a blind pool, the personal direction of the president, and shareholders are unable to any satisfactory statement as to what their holdings represent.

reason of the settlement of the protracted litigation between the amated Copper Co. and United Copper Co., February, 1906, through the the Heinze holdings in Butte to the Butte Coalition Mining Co., the of the United Copper Co. was changed materially, the company having business as the owner of sundry stocks and bonds of various subsidiary and holding corporations operating in Butte, as given in detail in . The price paid by the Butte Coalition Mining Co., for the various holdings taken over, is said to have been $14,000,000, but apparently art of this amount was in cash, the balance being in shares of the Butte on Mining Co., which appreciated materially in market price, the con- ion actually being rendered considerably greater than stated, in case the Copper Co. sold its holdings in Butte Coalition at the high prices ruling copper share market during the latter half of 1906 and the first quarter 7. Apparently the United Copper Co. has disposed of the bulk of its Coalition stock, which was its most valuable asset.

he shareholdings of the United Copper Co. are known only to the manage- but are supposed to include, and doubtless do include, control of the na Ore Purchasing Co., Basin Reduction Co., La France Copper Co., Ohio Co. and Stewart Mining Co., latter owning a lead mine in the Cœur e district of Idaho. Some of the holdings in subsidiary corporations are btful worth, while others are valuable, but in nearly every case the iary corporations are in need of cash, for further development.

May, 1906, the stockholders of the United Copper Co. authorized the $1,000,000 Montana Ore Purchasing bonds, and $2,500,000 Nipper Con- ed bonds, at par, to the Butte Coalition Mining Co. This presumably carry out a bargain previously made, and it is presumed that the con- ion was in shares.

os. M. Hodgens, an owner of 1,300 shares of preferred stock in the Copper Co., and formerly cashier of the Heinze bank, at Butte, secured ernative writ of mandamus, July, 1907, requiring the company to show ks, and disclose whence earnings were secured, but apparently no such ure was made. Mr. Hodgens alleges that earnings of the company were re than $1,000,000 in 1906, when an inspired article in the press said he net profits, from various sources, were $12,000,000, the company claim- rnings of $3,011,620 in 1906. The United Copper Co. was unable, 1908, nce La France Copper Co., a subsidiary corporation, to the extent of its taxes in Butte, amounting to about $5,000 only.

he company's annual reports are not satisfactory, referring as they do, *vaguest possible terms, to interests* in subsidiary corporations, without

giving definite information as to the extent of such interests. At present the United Copper Co. does not control any producing mines. The Stewart lead mine is a property generally considered valuable. The Ohio Copper Co. probably is the chief asset of the United Copper Co. at the present time, and is a property of much promise. La France Copper Co. has a zinc mine, of doubtful value.

The United Copper Co. being operated as a blind pool, shareholders have no protection whatever, and are at the mercy of the management, which has not shown itself overscrupulous. Shareholders were tremendous losers in the slump of 1907, when both preferred and common shares declined to merely nominal values. Nobody outside of the management has any exact idea of what the company owns, or does not own, but it is certain that the company does not own anything like the equivalent of its capitalization, though some of its properties, notably the Ohio, are of decided promise.

UNITED COPPER CO. **WASHINGTON.**

Office: 512-705 First Ave., Seattle, Wash. Mine office: Galena, Kittitas Co., Wash. Organized under laws of Washington, with capitalization $2,000,000, shares $1 par. Lands, 310 acres, also a 60-acre millsite, well timbered, with available water power, on Camp Creek, a branch of the Cle Elum river, said to show 3 veins, carrying chalcocite and chalcopyrite, the main vein, of 50' to 100' claimed width, said to be traceable 4 miles, carrying chalcopyrite, with a parallel vein and a cross vein carrying chalcocite. Mine is claimed to have circa 1,800' of tunnels, showing ore assaying up to 31% copper and $5 to $10 gold per ton. The Seattle Mining Exchange, having the same address as the company, claimed, 1906, in an advertisement, to have 1½ miles of chalcopyrite 50' to 100' wide, assaying $50 to $100 per ton, and copper glance 1½ miles in length assaying $200 to $300 per ton, with an 1,800' bornite ledge of 55' width adjoining the property on the same ledge, latter having a paystreak giving $1,400 per ton in gold, in addition to copper, which statements must have been made by a lunatic or a colossal liar. Property considered promising, but standing of company has been injured by the preposterous falsehoods told in its behalf.

UNITED COPPER EXPLOITATION & MINING CO. **NEVADA.**

Office: 511 Continental Bldg., Denver, Colo. Mine office: Ely, White Pine Co., Nev. A. L. Emberson, president; W. E. Flodin, vice-president; M. C. McKinnon, secretary and treasurer. Organized May, 1907, under laws of Arizona, with capitalization $10,000,000, shares $1 par. Lands are said to be 2 claims in the Ely district, and 12 claims in the Ward district, both in White Pine county. Promoters notified the public to come in as "ground floor organizers," on the basis of $250,000 cash for the lands, which seems a long way from the ground floor. Advertisements of company were highly untruthful and misleading. Cannot be learned that any development has been made, and company apparently is merely a bit of stock-jobbery.

UNITED COPPER-GOLD MINES CO. **OREGON.**

Office and mine: Grants Pass, Josephine Co., Ore. O. S. Blanchard, president; O. A. Thomas, secretary and manager. Lands, on Pickett Creek, an affluent of the Rogue River, 14 miles south of Grants Pass, are said to show veins of 5' to 10' width, carrying ore similar to that of the Waldo mine, giving assays of 6 to 8% copper and $30 to $100 gold per ton.

UNITED COPPER-GOLD MINING & EXTRACTION CO. **ARIZONA.**

Dead. Was still-born. Formerly at Morristown, Maricopa Co., Ariz.

UNITED COPPER MINING CO. **ARIZONA.**

Dead. Formerly at Tucson, Pima Co., Ariz.

UNITED COPPER MINING CO. **WASHINGTON.**

Office: 211 Jamison Blk., Spokane, Wash. Mine office: Chewelah, Stevens

Wash. Employs circa 30 men. Conrad Wolfle, president and general manJ. W. Beckett, vice-president; Gale Smith, secretary and treasurer; Frank ck, superintendent; Wm. H. Stowell, engineer. Organized July 16, 1906, laws of Washington, with capitalization $1,000,000, shares $1 par; issued, 00. Bonds, $20,000 authorized. Annual meeting, fourth Thursday in ry.

ands, 8 claims, 2 fractional, unpatented, area 165 acres, also 200 acres llaneous lands, in the Chewelah district, 6 miles from a railroad, showing and schist, carrying an ore body of 6′ average width, traceable 800′, ng malachite, chalcopyrite and tetrahedrite, estimated to average 2.9% r, 6 oz. silver and 40 cents gold per ton. Ore is mainly chalcopyrite, with onal native silver.

evelopment is by shafts of 65′, 175′ and 270′, and by an 1,100′ tunnel on opper King property, of which 735′ is crosscut and 365′ in ore, mine g 1,610′ of workings, estimated to show 100,000 tons of ore.

quipment includes a 150-h. p. steam plant, with hoist, 2-drill and 4-drill din air-compressors, and 7 power drills. There are 5 mine buildings, ing a 16x24′ wooden machine shop.

roduction 1907 was 11,097 lbs. fine copper and for 1908 was circa 360,000 ine copper, and is estimated by company as likely to be about 1,000,000 n 1909. Ore was shipped to the Northport smelter. Company plans nuous development and building a 6-mile railway spur. Property consid- promising.

TED ELY COPPER CO. **NEVADA.**

Office: Goldfield, Nev. Letter returned unclaimed from former mine , Ely, White Pine Co., Nev. G. L. Rickard, president and general man- R. L. Colburn, vice-president; W. H. Waterman, secretary; H. Cook, urer; H. Chase, superintendent. Organized Oct. 22, 1906, under laws evada, with capitalization $5,000,000, shares $5 par. Lands, 20 claims, 400 acres, tested by two 250′ churn drill holes, showing no copper.

TED ELY MINES CO. **NEVADA.**

Mine office: Ely, White Pine Co., Nev.

TED EMPIRE CO. **BRITISH COLUMBIA.**

Dead. Was succeeded, December, 1906, by United Empire Co., Ltd. For- y at Princeton, Boundary district, B. C. Fully described Vol. VI.

TED EMPIRE CO., LTD. **BRITISH COLUMBIA.**

Office and mine: Princeton, Yale district, B. C. Wm. C. McDougall, dent and general manager; John M. Smith, secretary; preceding officers, M. L. McDougall, John M. Murray and R. L. Reid, K. C., directors. Organ- December, 1906, under laws of British Columbia, as successor of United ire Co., with capitalization $500,000, shares $1 par; issued, $306,000. An- meeting, first Tuesday in November.

Lands, 9 claims, area 250 acres, also 692 acres of coal lands and 2,500 acres iscellaneous lands, in the Similkameen district. The copper lands show tone, diorite and sandstone, carrying 2 ore bodies, of which one, under lopment, is estimated at 100′ width, and is said to be traceable 4,500′; ing malachite and occasional azurite, with chalcopyrite at depth, ore estimated to average 2% copper, 2 to 4 oz. silver and $1 to $2 gold per Development is by shafts of 30′ and 50′, and by tunnels of 125′, 225′ 80′. There are about 2,000 tons of ore available for extraction, but no as been blocked out for stoping. Adjoining the copper ore, on the west- oundary, is a series of coal measures, apparently of promise. Fuel is mined from the company's lands, costing circa $1.50 per ton. Manage- plans continuous development.

UNITED EXPLORATION CO. WYOMING.

Office: 113 Devonshire St., Boston, Mass. Mine office: Battle, Carbon Co., Wyo. Succeded Beulah Copper Co. Lands, 13 claims, area circa 250 acres, developed by an 800′ tunnel. Idle several years and presumably moribund.

UNITED GERMAN COPPER MINES, LTD. GERMANY.

Dead. Dissolved, September, 1904. Formerly at Münster-am-Stein, Bavaria, Germany.

UNITED GLOBE MINES. ARIZONA.

Office: 20-99 John St., New York, N. Y. Mine office: Globe, Gila Co., Ariz. Jas. Douglas, president; Geo. Notman, secretary and treasurer; Niles S. Berray, superintendent; Robt. B. Riddell, chief clerk. Capitalization $2,300,000, shares $100 par. Is controlled, through ownership of majority of stock, by Old Dominion Co. Paid dividends of $6.50, Dec. 15, 1905, and $4, July, 1907.

Lands, 29 claims, lying west of the Old Dominion group, also 3 millsites. The mine is extensively developed, having a 765′ three-compartment shaft, showing a vein of circa 30′ width, carrying an ore chute of 700′ length, averaging 4% copper and upwards. Early 1908 the Maggie vein was cut, 85′ north of B shaft of the Old Dominion, on United Globe ground, this showing sulphide ore of excellent average tenor, including considerable massive chalcopyrite. The ore bodies of the United Globe are extensive, but erratic, and are highly silicious, requiring heavy fluxing, and the mine is wet. Leasers formerly working on the property produced ores averaging 20% copper and 1 to 15 oz. silver per ton, but the first grade ore mined by the company now averages circa 14% copper, or less.

A 200-ton smelter has been idle for some years, and is not likely to be blown in again, as the mine is operated under a close working agreement with the Old Dominion Copper Mining & Smelting Co., details of which are given in the description of the Old Dominion Co., and, to all practical intents and purposes, the United Globe is now a portion of the Old Dominion mine.

Production was 4,607,537 lbs. fine copper and 5,277 oz. silver in 1906, and 3,399,084 lbs. fine copper and 12,382 oz. silver in 1907.

UNITED GOLD & COPPER CO. ARIZONA.

Office: Columbian Bank Bldg., Pittsburg, Pa. Mine office: Hereford, Cochise Co., Ariz. J. L. Currier, president; S. B. Manning, secretary and treasurer. Capitalization, $1,000,000. Lands, 11 claims, area 220 acres, 7 miles from Hereford, said to give fair surface indications of copper, with a 137′ tunnel. Idle.

UNITED GOLD & COPPER CO. NEW MEXICO & CALIFORNIA.

Dead. A swindle that sold stock and paid dividends simultaneously. Formerly at Lordsburg, Grant Co., N. M. Fully described Vol. V.

UNITED GOLD & COPPER MINING CO. COLORADO & NEW MEXICO.

Dead. A swindle. Formerly at Turret, Chaffee Co., Colo. Described Vol. V.

UNITED GREENWATER COPPER MINING CO. CALIFORNIA.

Dead. Merged Dec. 12, 1906, in the Greenwater & Death Valley Mining & Smelting Co. Formerly at Greenwater, Inyo Co., Cal.

UNITED METALS CO. ALASKA.

Mine office: Coppermount, Prince of Wales Island, Alaska. Harry Corbin, superintendent, at last accounts. Lands, about midway between Coppermount and Sulzer, giving a promising showing of high grade ore, and a little ore was shipped, 1905, to the Coppermount smelter. Presumably idle.

UNITED METALS SELLING CO. NEW YORK.

Office: 42 Broadway, New York, N. Y. Works office: Perth Amboy, Middlesex Co., N. J. Adolph Lewisohn, president; Henry H. Rogers, vice-president; A. W. Evarts, secretary; Urban H. Broughton, general manager;

V. Stuart Wortley, treasurer; preceding officers, Wm. Rockefeller, Jesse sohn and Frederick P. Olcott, directors. Organized Jan. 29, 1900, under of New Jersey, with capitalization $5,000,000, shares $100 par. Regular end is 7½%, quarterly. Dividends have been 15% in 1900; 5% in 1901; in 1902, 1903 and 1904; 20% in 1905 and 1906, and 30% in 1907, with dividend disbursements of $6,250,000 to Dec. 31, 1907.

The company does a general commission business in metals, and is the st copper broker in the world, being sales agent for the Amalgamated er Co. and producers affiliated with the Amalgamated, and a considerable er of independent producers. This company "held the umbrella" over copper market in 1901, and again in 1907, enabling independent com- s to market their copper, while the production of the Amalgamated and ffiliated companies was held back. Company sells yearly, 200,000,000 to 00,000 pounds of Amalgamated copper, and 250,000,000 to 300,000,000 ds of other copper, on a commission, formerly 1½%, which was cut, 1906, %, when copper passed 18 cents per pound in price. The commission is o means excessive, in view of the facilities offered, these including the antee of all sales accounts, and, when desired, advances of 75 to 90% of nvoice value of copper. A considerable part of the company's profits are ed from its extensive refining operations.

The Raritan Copper Works, on New York Harbor, completed 1899, and enlarged, is one of the largest and most modern copper refining plants in world, the works including a smelter and mammoth electrolytic refinery. smelter, having 2 furnace buildings, has two 100-ton furnaces casting es in iron moulds on a mechanical conveyor, and two 150-ton casting fur- for wire-bars and anodes.

The electrolytic refinery includes two tankhouses and a power-house, con- d by 3' concrete tunnels, power consumption being about 3,000 kilowatts, works having a capacity of nearly 1,000,000 lbs. finished copper daily. l is the old and No. 2 the new tankhouse, latter completed circa 1907. l tankhouse has 1,600 tanks, each holding 21 anodes and 21 cathodes, of 24x36", using a current of 5,000 amperes, with a cross-sectional area of 5 square inches in the busbars.

No. 2 tankhouse is 150x184' in size, having concrete foundations, with steel e and brick walls, special Berlin brick being used for the basement floor, being considered acid-proof. Permanent equipment includes 1,370,000 ds of lead, of which 1,500,000 pounds are in tank linings, and 581,000 ds of copper, divided as follows: copper cathode rods, 186,000 pounds; ping plates, 122,000 pounds; busbars and connections, 170,000 pounds; , etc., 100,000 pounds; lead anode rods, 300,000 pounds. No. 2 tankhouse 3 bays, running lengthwise, with two 10-ton 3-motor Whiting cranes in bay, equipped with special devices for handling an entire tankful of es or cathodes at one load. No. 2 tankhouse has 3 electric circuits, run- lengthwise, one in each bay, each circuit of 396 tanks being handled the power-house by one electric generator. Current is 7,500 amperes, giv- a current density of 20 amperes per square foot. Main conductor has a -sectional area of 12¾". There are 1,188 depositing tanks, arranged in ests of 11 cells each, electrode arrangement being on the Walker system, being lined with 6-pound lead containing 4% antimony. There also are al tanks for rinsing the cathodes, after removal from depositing tanks anks for scrubbing slimes from scrap anodes, latter amounting to abou by weight. Works have special shears for trimming cathode loops, an rrow loop machine for attaching copper lugs to the cathode startin s. Anodes are 28x36" and cathodes are 30x37", each tank having 2 s and 25 *cathodes, spaced on* 4⅝" centers, cathodes remaining in tan

eensland, Australia. John Currie, chairman; Currie, Buchanan & s; J. T. Coates, mine manager; W. H. Rands, consulting engineer. rca April, 1908, under laws of Queensland, with capitalization s 7s. 6d. par; issued, 130,000 shares, 3s. 6d. paid up. Company uction of the Peak Downs Freehold Copper & Coal Co., Ltd., which uction of the Peak Downs Copper Co.

rca 1,200 acres, freehold, exempt from labor conditions. Property ık Downs mine, which, in early days carted ore circa 300 miles, ts therefrom of £278,250 in 15 years' operation. The mine, , by predecessors of present company, has a vein of 2' to 3' average g chutes of high-grade ore, and 3 narrow parallel veins of 6" to 20" as a whole, averages circa 4.5% copper. The mine, opened to has been thoroughly retimbered, and, when reopened, old pumps e found converted into copper precipitate, by the action of the ers.

er, built some years ago, has reverberatory furnaces, and a new -jacket-blast furnace was blown in, July 24, 1907, working inter- l October, 1907, when smelting was suspended, on account of the copper. Production, when the smelter was in blast, was said to s of matte daily, and a small amount of regulus was secured also. 907, is estimated at 500,000 lbs. fine copper. Mine is considered mising, but will require extensive development, its eyes having it by the old management.

IFS, N. L. **AUSTRALIA.**

78 Queen St., Brisbane, Queensland, Australia. Mine office: Black an, Queensland, Australia. C. C. Moulton, secretary; Cecil Rae, ger. Lands, known as the Shamrock mine, are 16 miles south of nelter has a 50-ton blast furnace and 2 reverberatories, difficulty ıced in securing adequate supplies of fuel and flux. Ore smelted 1% copper, 1 oz. silver and 9 dwts. gold per long ton. Employed it last accounts.

ATES & BRITISH COLUMBIA CO. **MONTANA.**

ce: Corbin, Jefferson Co., Mont. Lands, known as the Burton shallow shafts and a tunnel.

ATES COPPER CO. **IDAHO.**

e: Mullan, Shoshone Co., Idaho. Lands, 5 claims, known as the up, on Snowstorm Hill, east of the Missoula Copper Mining Co.

ATES COPPER MINES, INC. **ARIZONA.**

Louisville, Ky. Mine office: Wickenburg, Yavapai Co., Ariz. vman, Sr., president; J. C. Parker, vice-president; Geo. A. secretary and treasurer; Hector McRae, general superintendent; cers, Bernard Flexner, J. C. Parker, Samuel Taylor and W. D. ectors. Organized under laws of Kentucky, with capitalization

0 acres, said to have a 9' vein, with a 15" paystreak assaying 25% silver and $2.50 gold per ton, opened by 25 pits and shafts of 14' Company is backed by Louisville businessmen of good standing, isements, January, 1907, claimed to have a copper mine and not a ch is not the truth, and to have 30,000,000 tons of high grade ocked out, which is absolutely untrue. Company claimed that it copper at 6 cents per pound, which remains to be proven. One hareholder feels certain that the mines are superior to any in veral reasons, one of which is that a smooth wagon road stretches the end of the railroad to the mine, and this unprecedentedly

satisfactory transportation means facilitie
property." Is not regarded favorably.

UNITED STATES GOLD & COPPER CO.

Dead. Formerly at Chewelah, Stevens

UNITED STATES GOLD & COPPER COR

Office 1410 Real Estate Trust Bldg., Ph
boldt House, Humboldt Co., Nev. John M
president; J. Uhle Bethell, vice-presider
Humphrey, secretary; preceding officers,
A. E. Wager and Wm. Bromer, directors
Adamson, consulting engineer. Organized
ization $2,500,000, shares $1 par. Lands,
about 1,000′ of old workings, including a
170′ new tunnel, driven by present man
mine in the world offers a better showing
true. Is not regarded favorably.

UNITED STATES GOLD CORPORATION.

Office: 67 Fonda Blk., Boulder, Colo.
Colo. Edward Monroe, president and g
vice-president; John R. Wolff, secretary;
Rowell, superintendent. Lands, 300 acres,
Presumably idle.

UNITED STATES & GUERRERO EXPLO

Office: Ashland, Ky. Dr. J. Letton
$1,000,000. Lands, claimed to be 148 ac
Michoacán, latter near the Inguarán mine
sumably moribund.

UNITED STATES METALS REFINING C

Office: 100 Broadway, New York, N.
sex Co., N. J., and Grasselli, Lake Co., In
Chrome works, and 125 at the Grasselli
Vogelstein, vice-president; E. J. Hothorn,
urer; preceding officers, W. H. Coolidge, E
directors; H. A. Prosser, general manager;
Chrome works; Wm. Thum, superintendent

Organized November, 1903, under law
Oct. 15, 1906, with capitalization $4,000,000,
tive preferred and half in common shares
and half common stock. Is controlled, jo
United States Smelting, Refining & Mining
Halberstadt, Germany. Annual meeting, se

The Chrome works, of 12,000,000 lbs. m
smelting and converting plant for the trea
and bullion, copper supplies being recei
Arizona, California and British Columbia,
fields. The smelting department includes
for remelting blister copper, and 2 furna
There also is a circular blast furnace, 42"
an 11-oz. blast-pressure. Waste gases fr
under a Babcock & Wilcox boiler. The
dynamos of 1,000 and 1,200 h. p., giving,
volts, and 6,500 amperes at 130 volts.
monthly capacity of 3,000,000 lbs. finished

Metal is received in slabs and cakes,
to 400 lbs., by a Walker casting machine

red, in sets of 15, from the casting machine to the electrolyic tanks, ris traveling cranes.

electrolytic plant has 816 cells, forming two systems of 12 compart- with 34 baths each, 408 cells in a system. Tanks are lead-lined, 3′ 6″ ′ deep and 10′ long, each bath containing 15 anodes and 16 cathodes, the athode providing terminal plates. Cells are arranged in steps, in two ith a 12″ drop between tanks. Current is conveyed to the cells by leads of 1½x4¾″. Current density is 15 to 17 amperes per square d the difference of potential of bath is 0.3 volts. The cell bath temper- 52° to 57° C. Electrolyte contains 40 grams copper and 140 cc. sulphuric liter. The blister copper treated contains antimony, arsenic, selenium urium, as well as copper, nickel, gold and silver, and the sludge from the treated by filter presses and refined in a cupel furnace for gold and alues. As much silver is volatilized in refining, the gases from the are drawn off by a fan, then cooled and filtered through flannel sacks, entering the stacks. From the waste electrolyte liquor, crude nickel e and copper sulphate are made, there being, in connection with the , a sulphate plant where bluestone is produced for the requirements of ks.

e Grasselli plant, consisting of a 75-ton electrolytic lead refinery, at li, a suburb of Chicago, was the first electrolytic lead refinery in the States.

e plants of the United States Metals Refining Co. are strictly modern in and equipment, and are noted for the technical and commercial excel- f their practice.

D STATES & MEXICAN MINING CO. **MEXICO.**

ice: 42 Murray St., New York, N. Y. Mine office: Hostotipaquillo, lco, Jalisco, Mex. Isaac P. Martin, manager. Lands include the Trinidad adalupe mines, carrying auriferous and argentiferous copper and lead es. Has water power, employing circa 75 men, at last accounts.

D STATES & MEXICO CONSOLIDATED MINING CO. **MEXICO.**

ce: 110 State St., Boston, Mass. Letter returned unclaimed from mine office, La Cananea, Arizpe, Sonora, Mex. W. C. Humphrey, presi- . Allen, secretary; Geo. W. Farrington, superintendent. Organized , 1906, under laws of Arizona, with capitalization $2,500,000, shares $5 nds, 30 pertenencias, area 74 acres, on the western slope of the Sierra circa 30 miles east of Cananea, said to have a shaft. Company to plan shipping 300 tons weekly, by wagon, and also claimed to plan a 300-ton smelter, but apparently neither shipped ore nor built a reduc- nt. Regarded with suspicion.

D STATES MINING CO. **UTAH.**

ce: 400-55 Congress St., Boston, Mass. Operating office: 508 Dooly lt Lake City, Utah. Mine offices: Bingham Canyon, Salt Lake Co., nd Eureka, Juab Co., Utah. Wm. G. Sharp, president; Wm. F. Coolidge, sident; F. Winthrop Batchelder, secretary and treasurer; Albert F. managing director; Frederick Lyon, assistant managing director; pre- officers, R. D. Evans, Eugene N. Foss, N. W. Rice, E. C. Swift, J. J. and Sidney W. Winslow, directors; Hon. C. E. Allen, general manager; Maybury, mine superintendent at Bingham; R. A. Brown, mine superin- at Tintic; Richard E. Parker, consulting engineer; Percy Williams, r; Aron Hirsch & Sohn, sales agents.

ganized 1899, and reorganized, 1901, under laws of Maine, with capital- $15,000,000, shares $25 par. Debentures $500,000 due May, 1909. Is ed, through ownership of 98% of stock issue, by United States Smelting, *g & Mining Co., stock control having* been obtained through exchange

shares. Has circa 6,000 shareholders. City Trust Co., National Shawmut Bank, Boston, registrar. Annual

curities holding corporation only, controlling, through nership, the United States Mining Co., United States h Copper Mining Co. The company also controls, e majority of stock, the Centennial-Eureka Mining Co. and United States Lime Co., and owns a d common stock issue of the American Explora- d, latter half of 1908, a controlling interest in Mining Co., and controls, through practically pañía Minera Real del Monte y Pachucha, of ght for 3,800,000 pesos. Controls, through Peruvian Mining, Smelting & Refining Co. States Metals Refining Co., other half being Halberstadt, Germany. The company also rest in the shares of the Richmond-Eureka corporations are described separately, of the United States Mining Co. was ths in preferred and one-fourth in ting, Refining & Mining Co. having hare cash bonus, for each share of

in quarterly dividends of 1¾%, first dividend having been paid on common stock, and in 1908 each, on common shares. The mon and preferred shares, are

surplus of $4,067,087, which other dispositions, to a net at $3,000,000 during the early 1908. Net earnings Net earnings were said to in October, 1908, showing

diary corporations, was 92 oz. silver and 162,537 on for 1907, including fine copper, 53,617,324 with a gross value of edingly bad year. Co. is an ambitious of the Amalgamated ining Co., commonly has properties of While the company in 10 years has ment is assured,

ARIZONA.

works office: Clark, presi- y and treas- ant general

of shares, with a cash bonus paid to the U
through ownership of entire capital stock,
controls, through ownership of practi
Centennial-Eureka Mining Co.; controls, t
stock and bonds, Niagara Mining & Smel
the International Metals Selling Co. Nationa
Annual meeting, in October.

The properties at Bingham include
mercial, Galena and adjoining claims.
through a controlling stock interest. Th
decided, October, 1907, in favor of the
Col. E. A. Wall over the Kempton lode.
Oregon pine, and were said, 1906, to have
for stoping, of which about 90% was low g
an aërial tramway, of 25 tons hourly capaci

The Old Jordan and Telegraph prope
opened on a fissure vein of silver-lead ore
dyke from which production has been secur
has about 5 miles of workings, developing a
are silicious and deficient in iron, requirin
from 1.5% to 2% copper, 2 to 5 oz. silver a
said to give smelter returns of 26 to 28 lbs
gold and silver values per ton. Litigation
1905, in company's favor.

The Galena mine, reopened circa 1905,
of $1,000,000 worth of ore, under previous
turns of 20% lead, 25 oz. silver and up to $
low grade copper values, in addition to a
shipping circa 400 tons daily, 1907, until

The Centennial-Eureka mine, of the Ti
under the title of its owner, the Centennial-

In addition to its metalliferous mines,
a large limestone quarry and iron mines, sup
colliery having a coking plant in connecti
control and ownership of ores, fluxes, fuel a
ment, are very great.

Smelting is done by the United States
tion, and the smelter is described under titl

Production was 15,841,667 lbs. fine co
ending Oct. 1, 1905, the smelter produced,
copper, 10,208,226 lbs. lead, 2,107,956 oz. sil
years production is included in figures of
Mining Co., which also include California co
mine. Smelting was suspended, at the en
resumed, 1908, and copper smelting is to
details regarding closely related interests wi
United States Smelting Co. and United Stat

UNITED STATES MINING CO.

Office: 1204-37 Wall St., New York,
dent; John T. Clarke, vice-president and t
shares $10 par, in $500,000 preferred and
securities holding corporation only, controll
stock issue of the Doane Verde Mining Co.
Lake Tunnel Site Mining Co., Penn-Wyomin
& Milling Co., latter of Ouray, Colorado.

neral land near the Reindeer, Bessie Wilgus and Coon Valley mines, le, Lake Co., Colorado.

TATES MINING & SMELTING CO. **MEXICO.**

Formerly at Hermosillo, Sonora, Mex. Described Vol. V.

TATES & NICARAGUA CO. **NICARAGUA.**

345 Fourth Ave., Pittsburg, Pa. R. A. Smith, president; M. K. ice-president; Wm. Rees, secretary and treasurer. Organized Apr. ider laws of Maine, with capitalization $1,000,000, shares $100 par. an exclusive government concession for mining, covering the two ates of Chinandega and Segvoia, in the republic of Nicaragua. Idle.

TATES SMELTING CO. **COLORADO.**

Colorado Springs, Colo. Mine office: Cañon City, Frémont Co., . Hawkins, president; Chas. J. Bocking, manager; R. H. Hawley, ent. Property is a 100-ton custom smelter, treating mainly zinc ndling also some copper and lead ores.

TATES SMELTING CO. **UTAH.**

400-55 Congress St., Boston, Mass. Operating office: 508 Dooly ake City, Utah. Works office: West Jordan, Salt Lake Co., Utah. en, managing director; Hon. C. E. Allen, general manager; H. A. tallurgical director; Geo. W. Heintz, superintendent; H. C. Bell- ilting metallurgist; T. R. Jones, manager custom ore department. d, through ownership of entire capital stock, by United States , which, in turn, is controlled by United States Smelting, Refining o.

150 acres, near the Utah Consolidated and Bingham smelters, 12 miles am and 80 miles from Tintic. The reduction works, which do a tom business, include a 100-ton concentrator, on the bank of the r, southwest of the smelter, and 2 sampling mills.

elter, of circa 2,500 tons daily capacity, includes lead and copper s. The lead smelter, built 1904, has three 100-ton water-jacket es, and six 70′ hand-roasters. In 1908 there were installed 26 asters, for lead ores, which, in effect, are sintering furnaces, raw ores. Each converter-roaster consists of a brick-lined square ′, with a 3′ hood, and a bottom of grate-bars, through which comes t. Charges require about 12 hours treatment, sintering to a solid is discharged by ram, like coke from a by-product oven, after intered cakes are broken in a Blake crusher, and crushed material tomatically to steel-cars, going thence to bins in the furnace-house, d with charges for the blast-furnaces.

pper department has six 200-ton water-jacket blast-furnaces, and a erberatory furnace. Pyritic smelting, employed originally in the ks, was abandoned. The converter department has 2 stands, with traveling crane, briquetting plant for fires and flue-dust, and a The smelter has a 300′ steel stack, connected with the furnaces by separate brick flues lead to a baghouse.

ghouse is perhaps the best planned and constructed, and certainly is most successful, in existence. The building is 58x192′ in size, with of one-half the size under construction, late 1908. The baghouse partments, with steel floor, underneath which is a 12′ basement, ars, each divided into 3 sections. There are 2 fans, driven by a lectric motor, drawing smoke and fumes from all parts of the he gases, having an initial temperature of 300° C., are cooled, by ough 3 series of steel tubes, from one brick chamber to another, ch 2′ in diameter and 20′ long, connecting each chamber, the gases *through a steel tube 30′ long* and 6′ in diameter, into the baghouse,

)0 common shares. Has circa 6,000 shareholders. City Trust Co., ransfer agent. National Shawmut Bank, Boston, registrar. Annual in May.

company is a securities holding corporation only, controlling, through ly entire stock ownership, the United States Mining Co., United States Co. and Mammoth Copper Mining Co. The company also controls, ownership of a large majority of stock, the Centennial-Eureka Mining ted States Stores Co. and United States Lime Co., and owns a of both preferred and common stock issue of the American Explora- The company secured, latter half of 1908, a controlling interest in ion-Beck & Champion Mining Co., and controls, through practically ock ownership, the Compañía Minera Real del Monte y Pachucha, of which property was bought for 3,800,000 pesos. Controls, through p of 100,000 shares, the Peruvian Mining, Smelting & Refining Co. half interest in the United States Metals Refining Co., other half being y Aron Hirsch & Sohn, of Halberstadt, Germany. The company also ghtly less than a majority interest in the shares of the Richmond-Eureka Co. The various subsidiary corporations are described separately, eir respective titles. Control of the United States Mining Co. was by exchanging stock, three-fourths in preferred and one-fourth in shares of the United States Smelting, Refining & Mining Co. having en, share for share, plus $1 per share cash bonus, for each share of States Mining Co.

pany pays 7% on preferred stock, in quarterly dividends of 1¾%, January, April, July and October, first dividend having been paid 1906. Dividends were begun, 1907, on common stock, and in 1908 pany paid 4 quarterly dividends, of 1% each, on common shares. The 's dividend requirements, for both common and preferred shares, are 00 yearly.

company ended 1907 with an available surplus of $4,067,087, which down, by adding $733,255 to reserve, and other dispositions, to a net of $557,003. The floating debt, estimated at $3,000,000 during the eriod, late 1907, was considerably reduced, early 1908. Net earnings ,504,522 in 1906, and $2,386,539 in 1907. Net earnings were said to en circa $350,000 in September, and $385,000 in October, 1908, showing ntial recovery in business and profits.

duction, 1906, including outputs of all subsidiary corporations, was 87 lbs. fine copper, 27,828,644 lbs. lead, 4,852,292 oz. silver and 162,537 l, with a gross value of $14,747,746. Production for 1907, including of all subsidiary companies, was 38,518,378 lbs. fine copper, 53,617,324 d, 6,739,269 oz. silver and 235,822 oz. gold, with a gross value of ,655, giving net earnings of $2,386,539, for an exceedingly bad year.

e United States Smelting, Refining & Mining Co. is an ambitious king, and must be considered a serious competitor of the Amalgamated Co., Federal Lead Co. and American Smelting & Refining Co., commonly the copper, lead and smelter trusts. The company has properties of resent value, and much greater potential worth. While the company de mistakes, it invariably has profited by them, and in 10 years has from a position decidedly dubious to one where its present is assured, future most promising.

D VERDE COPPER CO. **ARIZONA.**

ce: 901-49 Wall St., New York, N. Y. Mine and works office: Yavapai Co., Ariz. Employs circa 900 men. Hon. Wm. A. Clark, presi- s. A. Macdonald, vice-president; H. H. St. Clair, secretary = has. W. Clark, *general manager*; Will L. Clark, assista

Dividend payments were begun, 1892, by old company, cents per share monthly, increased, 1896, to 50 cents per s again increased, 1898, to $1 per share monthly, maximun $4,498,680 in 1899, in which year the net earnings were $ dividends have been as follows: $2,025,000 in 1905; $2 $2,700,000 in 1907, with total dividend disbursements, to $24,405,680.

Lands, 13 claims, patented, area 230 acres, with sundry including the North Venture and South Venture claims, wh a little high-grade ore, in the Verde district of the Black average elevation of 5,600′ above sea-level, and about 1,800 of the Verde river. Property shows porphyritic rocks, sla mine, being in a zone of slates and intrusive dioritic rock limestone being superimposed unconformably, and apparent nection with the ore deposits. The United Verde was a sm mine, discovered 1880, opened 1883, and closed 1885, be until bought, 1888, by Senator Clark, who has developed it in mines of the world.

The mine is opened on a single monstrous lense of sulphi circa 600′ extreme width and about 1,900′ length, proven the ore body consisting of more or less irregular masses, in a disturbed area, the lense having a dip of 72° and being quartzite dyke that carries about 1% copper, and from 1 to which is used for converter linings. The gossan outcrop, and argentiferous oxidized ores to depth of circa 160′, has The zone of secondary enrichment carries mainly chalcocite, and other alteration minerals of copper, all highly argent zone carries mainly chalcopyrite, with a little bornite, bo argentiferous. No ore assortment is attempted, and no cen everything from the mine going to the furnaces, the avera openings formerly being circa 6.5% copper and 15 to 32% su orable gold and silver values. The ore, as a whole, is not s

Underground openings are very extensive, with enor estimated as high as 20,000,000 tons, which is much too h

h will keep a sulphur fire burning incessantly. The most serious fire, ast, 1902, caused a total suspension of mining, but finally was gotten ontrol by pumping the mine full of carbonic acid gas, this being made ting crushed limestone with dilute sulphuric acid, in iron tanks, the ng forced, by natural pressure, into the top of the shaft, whence it fell, ity, to the bottom of the mine, displacing the lighter atmospheric air. il, 1905, a serious explosion killed 5 men, and for a time threatened ire mine. The fire had eaten its way to a point below the 700′ level, ave on this level, caused by the fire, fissured the superincumbent rock- that surface water from the heavy spring rains seeped down into the ie, generating steam that blew out the solid masonry bulkheads and ered the lives of the miners by steam and sulphur fumes—a truly dia- combination. In fact, the explosion at the United Verde might be an artificial volcano, just as the "air-blasts," at the Quincy and other Superior mines, are called artificial earthquakes. The fire on the 400′ as been burning since 1897, and the mine is on fire in various places, he 7th level to surface, fire in stopes not worked being walled off by bulkheads having steel gates. Mining is in progress in the fire zone, 300′ level, under the Plenum system, introduced by J. J. Shaw. By ethod, air under pressure is blown against the face of the stopes, by fans. The air feeds the fire, which is a smouldering one, but drives he deadly fumes into the shattered rock-mass, and permits the extrac- f ore. The fire, while dangerous and annoying, cannot destroy the , all of which will be recovered, eventually, by mining or leaching.

ie mine is subject to bad caves, one of which carried down the office ig and killed a number of employes, some years ago. Owing to fires ves, the shafts sunk in ore were subject to drawing, causing their ulti- abandonment, new shafts being sunk in the country rock. From a 's standpoint, the United Verde is not an especially desirable working- as the openings are very hot, and the acid waters cause blisters and ipon the unprotected skin, while the mine fires and caving ground render ground work more or less hazardous. Strenuous efforts have been made der the mine safer, but, owing to its having been opened wrongly at art, such efforts are made at a disadvantage, but the mining system has much improved latterly, and the United Verde, while by no means an place for the employment of persons with weak nerves, is much safer ormerly.

evelopment is by shafts of 500′ and 1,000′, and by tunnels of 800′, 2,640′ 593′, tunnels having electric haulage. The old main shaft, 6x18′ in size 0′ deep, is no longer in use. The new main shaft, with 5 compartments, 000′ deep, was located 900′ from the old main shaft, to sink continuously ntry rock, but cut ore at 600′ depth, and has held it to the bottom, con- ly extending the known ore limits of the mine. Equipment of the ain shaft includes 4 cages, worked in counterbalance.

ie new drainage tunnel, of 6,593′ length, was begun Dec. 23, 1906, and ted Sept. 10, 1908, being driven from both ends, in less than 21 months. unnel, running from the Verde valley, connects with the workings on ttom level, at depth of 1,000′, and drains the entire mine. The tunnel in the clear, and at the bottom is a 2x2′ water conduit. The tunnel e track, with room for a second, to be added later.

e surface plant and smelter are located on top of the mine, the precipi- alls of the cañon rendering such a location obligatory, when the mine ened. Equipment includes a steam plant, of about 2,600 h. p., with 2 ul hoists, and a compound air-compressor of 6,000 cubic feet capacity lute, having steam *cylinders of* 28″ and 52″, with 48″ stroke, and air

120' apart, copper being precipitated from the mine water on

All ore above 12% in copper tenor is sent direct to the s being trammed through the tunnel on the 500' level to the ro the ore is heap-roasted, with cordwood, on contract, each 500-t ing 5 to 9 weeks for roasting. After roasting the ore is tran the mine, through the tunnel, and hoisted through the shafts the exceedingly precipitous nature of the ground rendering it i secure direct connection between the smelter and roast-yard, the mine.

The smelter is built on the hanging wall side of the mine, ore body, and there has been considerable trouble from cavin smelter was practically rebuilt, 1903, while in blast, and anc furnace was installed, 1907. Equipment includes 5 rectangul blast-furnaces, 4 of circa 500 tons daily capacity each, and 48x240", of 750 tons capacity, giving the works a nominal ca 2,750 tons daily, but, in practice, one blast-furnace is held i spare. The reverberatory furnace, formerly used for smeltin ores exceptionally rich in gold and silver, has been dispensed small tilting furnace for casting anodes. The smelter stack has catch flue-dust, which carries high values in gold and silver. department has 6 stands, 15 shells and two 50-ton traveling are shipped for refining mainly to the Waclark Wire Works, at Jersey, controlled by Senator Clark, where the gold and si electrolytically, copper being used mainly for drawing into wi been rumors at intervals that the smelter would be removed, tailing, very circumstantially, the alleged plans of the manage new smelter at Farmington, New Mexico, near coal, but, wh may be removed later, it will not go to the fuel, but will rema and possibly new works may be built near the mouth of the which would seem about the best site available in the near vicin

The United Verde & Pacific Railroad, controlled by the 28-mile narrow-gauge line connecting the mine with the Santa Prescott railroad, at Jerome Junction, this line traversing country. Consideration has been given, tentatively, to the e

1,733 oz. gold, valued at $6,557,918, in 1907; circa 34,000,000 corresponding gold and silver values, in 1908.
ears the United Verde made copper for 5 cents per pound, and , after deducting gold and silver values contained, but present higher. Cost, per pound of finished copper, after deducting values, has been as follows in recent years: 9.17 cents per 9.27 cents per pound in 1905; 8.69 cents in 1906; 10.54 cents ts for 1907 having been abnormal. Under average circumper of the United Verde may be figured as costing 9 to 10 with a marked tendency toward increasing costs.
Verde, owing to the former policy of the management, now doned, of withholding all information, has been lied about ly than almost any other mine in the world, and it has been y, that the mine made copper for nothing, the gold and silver all expenses, but this statement never was true, though likely the press, and in the prospectii of new mining corporations, r cash than for truth, for many years to come. The United been pointed out, repeatedly, as a perfect example of blind tory is no nearer truth than the others. The United Verde nator Clark when it was a thoroughly discredited gold-silver iberal applications of cash and brains, was developed into a er mine, consequently, the credit therefor is due to Senator o the goddess of chance. The mine, while it has seen its best st property, is one of the best copper mines of the world, and nd profitable producer for many years to come.

E COPPER EXTENSION CO. **ARIZONA.**
Jerome, Yavapai Co., Ariz. J. J. Fisher, manager. Was a the United Verde Extension Mining Co., which came to grief. , adjoining the United Verde, having a 581′ shaft, said to ore in bottom. Has steam power.

E EXTENSION MINING CO. **ARIZONA.**
L. Amster denies ever having been consulting engineer for 'ormerly at Jerome, Yavapai Co., Ariz. Described Vol. VI.

E JUNIOR COPPER CO. **ARIZONA.**
charter 1902; lands 1906. Was a stock-jobbing scheme, pro-F. Peach and Edwin Wallace. Formerly at Jerome, Yavapai

E JUNIOR COPPER MINING CO. **ARIZONA.**
ierly at Jerome, Yavapai Co., Ariz.

E SYNDICATE, LTD. **BRITISH COLUMBIA.**
of S. E. Ceperly, Vancouver, B. C. Mine office: Howe Sound, r district, B. C. Lands, 6 claims, area 240 acres, 40 miles nd, on Fitzsimmons Creek, showing large bodies of heavily st, carrying 1.5 to 9% copper and $2.84 gold per ton, with a roperty idle and cannot be operated to advantage until rail secured.

& GOLD MINING CO. **NEW MEXICO.**
ter forfeited 1902. Formerly at Tres Piedras, Taos Co., N. M.

R MINING CO. **WYOMING.**
ago, Ills. Letter returned unclaimed from former mine office, arbon Co., Wyo. Property is the Haskins group, near the as developing by tunnel, at last accounts.

CORPORATION. **UTAH.**
Broadway, New York, N. Y. Mine office: Alta, Salt Lake Co., *inson, president; Harry A. Lee*, vice-president; D. L. Schwartz,

copper ores.

UPINGTON COPPER SYNDICATE. C

Office: Brown's Bldgs., Johannesburg, Transvaal. Mine o Cape Colony. A. Dickson, J. Dale Lace, E. Brayshaw, J. J. H hoff and C. E. Campbell, directors; J. G. Davis, secretary. June, 1908, under laws of Transvaal, with capitalization £10,(an option of the Farm Aoovoorby, on the Orange river, near 30 miles southwest of Upington. The option is for £5,000 c shares, giving a purchase price of 15s. per morgen. The propert and malachite, associated with iron, in quartz gangue, ore assa copper from a number of shallow test pits.

SOCIEDAD MINERA UPOLONGOS.

Dead. Lands sold to Famatina Development Corporation, at Chilecito, Rioja, Argentina. Described Vol. V.

UREA MINING CO.

Dead. Formerly at Velardeña, Cuencamé, Durango, Mex.

URIQUE DEVELOPMENT CO.

Letter returned unclaimed from former mine office, Uriqu huahua, Mex. Lands include the Barranca de Gloriapán mine, s smelter assays, and the Santos Reyes mines, said to have a ve average width, carrying circa 100 oz. silver per metric ton, wit ore carrying circa 1,000 oz. silver per metric ton, opened by 2 t out considerable ore of good copper and silver tenor.

URUÁCHIC MINING & SMELTING CO.

Mine office: Uruáchic, Rayón, Chihuahua, Mex. H. T. Bo intendent. Has auriferous and argentiferous copper ore, with

UTAH AMALGAMATED COPPER CO.

Dead. Was reorganized, 1908, as Utah Gold & Copper Mi officers were Dr. C. E. Watkins, president; F. L. Burt, secretar L. G. Grew, superintendent. Capitalization was $1,000,000, Former landed holdings are described under title of Utah Gold Co. Formerly at Newhouse, Beaver Co., Utah.

UTAH APEX & HIGHLAND BOY CONSOLIDATED MINING

Mine office: Bingham Canyon, Salt Lake Co., Utah. O

May, 1902, under laws of Maine, as a merger of Copperfield nd York Mining Co., with capitalization $2,500,000, increased,),000, shares $5 par. Issued 26,000 shares of new stock, to share- 1907, and stock outstanding, April, 1907, was $2,641,000. Has issue of $500,000 convertible bonds, at 6%; outstanding, $189,000, 08. Owns a 50% interest in the Markham Gulch Mining & Mill- has a 150-ton mill. Has absorbed, since organization, the High- ing Co., Petro Mining Co. and Minnie Mining Co., and Decem- ured, for circa $100,000, a controlling share interest in the g Co., property of which adjoins the Utah-Apex. Federal Trust gistrar. Annual meeting, second Tuesday in September.

claims, area 162 acres, on York Hill, in Carr Fork Cañon, ad- ah Consolidated on the south and west, location being considered y originally was the York and Copperfield groups, to which the nd Highland Boy Consolidated groups were added. The prop- absorption by the present company, produced circa 300,000 tons ng chalcopyrite and lead carbonates and sulphides. Lands show quartzite, carrying the Parnell, Petro, York and Andy bedded which are more or less developed, these being traversed by 6 f which the Leonard, Louisa, York and Petro have been opened, carry ore, the Dana fissure, which is the widest, being unde- property carries ore values mainly in copper, though with good , silver and gold, ores carrying an excess of iron, giving low es, because of the premium paid for each excess unit of iron ters. First class copper ores carry only about 2% copper and per ton combined gold and silver values, while second class rry about $3 per ton in combined gold and silver values. First carry 35 to 50% lead, with gold and silver values, and second range 7 to 14% in lead tenor, with small gold and silver values. 908, sixteen shipments returned an average of 1.67% copper, .44 oz. silver and 50 cents gold per ton. The mine shows con- class ore, and large quantities of second class ore, and ore re- ncreased largely, during 1908, being estimated, at end of year, s of silver-lead ore, of $17 average value per ton.

ent is by 3 shafts and 6 tunnels, with circa 5 miles of workings. are known as the Parnell, Minnie, Smilax, Andy, Andy No. 2 each circa 200′ apart vertically, and connected by incline shafts, arnell vein, which is estimated, by the company, to average nd to be mineralized for about 1,000′ on its strike and 2,000′ The tunnels are connected by incline blind shafts, of 200′ and with electric hoists. The Andy tunnel opens 3 ore chutes on ein. The Parvenu tunnel, which is the principal opening, is length, planned to be extended to length of nearly one mile, arnell vein with a back of circa 2,200′. The company planned, lucing extraction costs by connecting the Parvenu tunnel, on , with other workings, by a 3-compartment blind shaft, to be

Bleichert aërial tram runs from the portal of the Andy tunnel to ion, whence ore is hauled by team to the Markham mill, circa ant. The company also has planned the construction of a 2,300′ from the mouth of the Parvenu tunnel to the Copper Belt railroad. t includes a 15-drill air-compressor and 2 electric hoists, ma- not being extensive, owing to extraction of ore mainly through

n, *of circa 100 tons of ore daily*, during 1907, was discontinued,

Oct. 1, 1907, returns to that date being $229,419.13, the last 18 shipme 1907, of circa 25 tons each, giving average returns of about $18 per ton. duction was resumed, Aug. 15, 1908, with shipments of about 30 tons increased later to 40 or 50 tons daily. Property considered decidedly pro

UTAH-ARIZONA GOLD & COPPER MINING CO. ARI

Office: Salt Lake City, Utah. Mine office: Chloride, Mohave Co Lafayette G. Burton, general manager; W. O. Young, superintendent. include the old Hall mine, 20 miles from Chloride, in the Weaver Company is said to have bought machinery for a 10-stamp mill, June, 1

UTAH-BINGHAM MINING CO.

Office: 547 Tremont Bldg., Boston, Mass. English office: 6 N St., London, E. C., Eng. Operating office: D. F. Walker Bldg., Sa City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. 25 men. Clarence S. Ward, president; Warren N. Akers, vice-president R. Shrigley, secretary; J. E. Meadowcroft, London secretary; preceding Robt. F. Miller and F. J. Minton, directors; M. F. Rowe, assistant t W. W. Bellows, general manager; P. M. McCrea, superintendent. Feb. 3, 1906, under laws of Maine, with capitalization $2,000,000, par, increased, Apr. 18, 1908, to $2,750,000, shares $5 par; issued, $ Owns 532 shares in the Ilion Mining Co. Federal Trust Co., Boston,

Lands, 17 claims, patented, area circa 115 acres, near the Teleg Old Jordan mines, showing limestone, quartzite and porphyry, carryi veins and irregular ore bodies in limestone, latter striking north average dip of 30°. The property shows 5 known ore bodies, 4 of said to carry ore of fair assay tenor, mainly silver-lead, with a little copper ore, latter expected to occur in considerable quantities depth. The limestone ore body, of irregular outline, circa 200′ i width and traceable about 3,000′, carries melaconite, chalcocite, ch and galena, estimated by company to average 2 to 5% copper, 10 to 5 to 16 oz. silver and 80 cents gold per ton.

Development is by a 200′ shaft and by tunnels of 250′, 360′, 420 900′, with a total workings of about 2 miles, of which about 3,000 in use.

Equipment includes a 100-h. p. electric plant, with a 100-h. Electric motor, taking current from the Telluride Power Co. Has a for 500′ depth, and a 5-drill Ingersoll-Sergeant air-compressor. Bu in number, include a 20x40′ wooden machine shop, 20x30′ smithy, 2 and 16x80′ boarding house.

Production, last quarter of 1908, was 100 to 150 tons of ore w direct to smelter, secured at estimated average mining cost of $ The property has developed considerable ore bodies, estimated, appa servatively, at 100,000 tons, with prospects of much greater tonn opened at depth. Property considered promising.

UTAH BUCKHORN MINING CO.

Dead. Was succeeded, circa January, 1908, by Del Verde Formerly at Ogden, Weber Co., Utah.

UTAH CONSOLIDATED GOLD MINES, LTD.

Dead. Reorganized, 1903, as Utah Consolidated Mining Co. F Bingham Canyon, Salt Lake Co., Utah.

UTAH CONSOLIDATED MINING CO.

Office: 949-42 Broadway, New York, N. Y. Mine office: Bin yon, Salt Lake Co., Utah. Works office: Murray, Salt Lake Co., U circa 4,000 shareholders. Urban H. Broughton, president; Adolph vice-president; T. L. Hermann, second vice-president; preceding offic Phillips, Jr., and C. N. King, directors; F. P. Addicks, secretary and

que, general manager; W. R. Smith, general superintendent; assistant superintendent; C. L. Morris, smelter superintendent; nson, mechanical engineer; E. P. Mathewson, consulting metal-r.

1903, under laws of New Jersey, with capitalization $1,500,000, as a reconstruction of Utah Consolidated Gold Mines, Ltd., a ion that, in turn, succeeded the Sevier Gold Mines, Ltd., Octo-perty of the Utah Consolidated Mining Co. is 2,490 shares of of the capital stock of the Highland Boy Gold Mining Co., of tter corporation holding direct title to the Utah properties. d on the Boston Stock Exchange.

of the present company, and its predecessor, have been as fol-in 1901; nothing in 1902; $900,000 in 1903; $900,000 in 1904; 905; $1,500,000 in 1906; $2,100,000 in 1907; $600,000 in 1908. ave been as follows: $1,038,637 in 1903; $1,164,348 in 1904; 905; $2,835,008 in 1906; $1,179,413 in 1907.

claims, patented, area 239 acres, known as the Highland Boy Fork Cañon, circa 2½ miles from Bingham Canyon. Company elter site, in Pine Cañon, Tooele Co., Utah, circa 4 miles across the mine, but this was sold, late 1908, to International Smelt-mpany has about 150 acres of mineral land, unexplored previous is to be thoroughly tested, and considerable diamond drilling 1908.

ty has 6 distinct ore bodies, with 3 main ore chutes developed, pproximately 320′ in extreme width, by 340′ in length, and of . It was claimed in the press, 1907, that the Highland Boy ore d into the Yampa, but this does not seem proven, though lower encountered at depth. The ore chutes apparently are leaner evels, though carrying good values, and likely to continue work-epth. Ores are sulphide, carrying 2 to 13% copper and $2.50 and silver values per ton, average ores carrying about 30% lica and sulphur, rendering them self-fluxing. Extensive under-ment was done, 1907-1908, proving much new ore of promise, rage of ore is lower in grade, since 1906. Some good new ore n opened toward the west, and considerable lead ore of promise pped. During 1907 the mine made nearly 2 miles of new open-d stopes were reopened, 1908. Ore reserves, 1907, were esti-930 tons.

nd Boy mine is opened by a 900′ shaft and 7 tunnels, of 1,000′ h, extraction being almost entirely through No. 7, the lowest s 700′ below the crest of the mountain. All tunnels are con-is milled down to the bottom tunnel for removal. There are 2 oists on the 700′ level, ore from the bottom workings being blind shafts to the level of the lowest tunnel. The ore breaks ood sized bodies, extraction being by the top slice caving sys-e-set timbering, expense for latter being heavy, with culls used d filling, and ore is broken mainly by contract. The mine has miles of workings, with electric traction in No. 7, the lowest ing tunnel.

ërial tram leads from the portal of No. 7 tunnel to ore-bins on Western railway. There is a subsidiary aërial tram, crossing n, used for handling lumber and mining supplies.

r, at Murray, 17 miles north of the mine, and 10 miles south of , is of circa 800 tons daily capacity, equipment including 20 *iners, 3 Wethey calciners and* 9 reverberatory furnaces, 2 of the

company would restrict production to 700 tons daily, which off peremptorily, and the smelter was blown out, January, 1908.

On suspension of smelting at the company's own plant, a 12- was made with the Garfield smelter, February, 1908, which extended, for 18 months, from Sept. 24, 1908. Smelting at the has been marked by much friction between the Utah Consoli American Smelting & Refining Co., the contention of the for costs are greater by about 2 to 2½ cents per pound of finished field, than they were at the company's own smelter.

The company planned, tentatively, a $1,250,000 smelter in district of Tooele county, Utah, 4 miles from the mine, whi necessitated a tunnel through or a costly aërial tram over between, or very possibly a combination of tunnel and aëri November, 1908, the company made a smelting contract with V of Butte, Montana, which was assigned by him to the newly-o national Smelting Co. This contract, for 10 years, provides for 1,200 tons daily of Utah Consolidated ores, on terms materially than were given by the Garfield Smelting Co., the contract als the sale, by the Utah Consolidated to the new smelting company site in Pine Cañon, and extensive smoke easements secured therewith. The contract calls for beginning of smelting April be necessary for the Utah Consolidated to construct, meantime, a system between its mines and the smelter, unless the Interna should see fit to provide such a system, with a view to securing also from the Bingham camp.

Production has been as follows: 233,700 tons ore, yielding fine copper, in 1904; 287,148 tons ore, yielding 17,264,474 lbs. cop silver and 28,290 oz. gold, giving an average extraction of 3% silver and 0.1 oz. gold per ton, in 1905; 18,533,974 lbs. copper, 4 and 42,001 oz. gold in 1906; 279,642 tons ore, yielding 13,987,3 390,296 oz. silver and 34,554 oz. gold, giving average returns of and 1.4 oz. silver per ton, in 1907. At end of 1908 mine was 800 tons of ore daily, to the Garfield smelter, said to average with reduced gold and silver values.

er. The Utah Consolidated is a very fine mine, with a good management, hould be capable of increased production, though it is probable that the osts of 1906 never will be repeated.

H CONSOLIDATED MINING & MILLING CO. **UTAH.**

Office: care of John Y. Smith, secretary and treasurer, Salt Lake City, Mine office: Eureka, Juab Co., Utah. Thos. R. Cutler, president; Hon. Smoot, vice-president; preceding officers, A. N. Holdaway and Hugh J. on, directors. Organized under laws of Utah, with capitalization $250,000, s 25 cents par. Lands, 4 claims, near the Sioux Consolidated, with devel nt planned by tunnel.

H COPPER CO. **CALIFORNIA**

Mine office: Lone Pine, Inyo Co., Cal. Samuel McRoberts, superintendent. nized 1907, under laws of Maine.

H COPPER CO. **UTAH.**

Office: 604 McCornick Bldg., Salt Lake City, Utah. Mine office: Bing Canyon, Salt Lake Co., Utah. Works office: Garfield, Salt Lake Co., . Employs circa 900 men. Chas. M. MacNeill, president; Daniel C. ling, vice-president, general manager and chairman executive committee; cer Penrose, secretary and treasurer; John Hays Hammond, managing tor; Pope Yeatman, associate managing director; A. Chester Beatty, con ng engineer; F. A. Gillespie, assistant secretary and treasurer; preceding rs, Wm. B. Thompson, Col. Chas. Hayden, J. D. Hawkins, Silas W. Eccles Kenneth K. McLaren, directors; Robert C. Gemmell, general superintendent; . Shilling, mine superintendent; John McDonald, assistant mine superin ent; Frank G. Janney, mill superintendent; Geo. F. Waddell, assistant superintendent; William Spencer, mining engineer; O. O. Bradley, mechan engineer; John M. Hayes, cashier.

Organized June, 1903, and reorganized Apr. 30, 1904, under laws of New ey, with capitalization $4,500,000, shares $10 par, increased, October, 1905, 6,000,000, and again increased, January, 1908, to $7,500,000, shares $10 par; ed, $7,347,500. Retired, 1906, outstanding balance of original bond issue $750,000, at 7%, paying a premium of 5% therefor. Bonds, authorized, 00,000, in denominations of $1,000, at 6%, convertible into stock at $20 share, at option of holder, prior to Jan. 11, 1911; outstanding, Dec. 31, 1907, 64,000. Dividends, quarterly, of 50 cents each, were paid Sept. 30 and Dec. 1908, amounting to $666,824. Controls, through stock ownership, the Bing & Garfield Railway Co., organized July, 1908, under laws of Utah, with italization $1,000,000, shares $100 par. A large share interest in the Utah per Co. is held by American Smelters Securities Co. Shares are listed on Boston and Paris Stock Exchanges. Morton Trust Co., New York, regis . Annual meeting, fourth Friday in January.

Lands, 18 claims, area 200 acres, with circa 2,000 acres in mill and smelter s, also sundry surface rights for dumping waste. In 1906 the company ght surface rights to 20 acres, for $37,500, from the Little Bell and Yel companies, and surface rights to 80 acres, for $15,000, from Bingham algamated company, for railroad right of way, waste works and dumping m. Mineral lands, bought of De Lamar Gold Mining & Milling Co., lie on h sides of Bingham cañon, permitting ore extraction by tunnel, to great th.

Lands show porphyry and quartzite, country rock being monzonite, no red, decomposed, frankly porphyry, that handles easily, yet stands well, ore g mainly chalcocite, with some chalcopyrite, quite evenly disseminated ughout the porphyry, with occasional veinlets carrying high grade chalcocite bornite. The porphyry ore runs 0.75 to 2.50% in copper value, and the rage of assays at Garfield smelter, 1906, was 1.80% copper, 0.55 oz. silver and

0.16 oz gold per ton, which was practically identical with the average assays of ore milled to that date. The monzonite ore body has been proven by extensive diamond drill borings, conducted on surface and from the main tunnel to depth of 500′, proving a continuance of the ore body for a thickness of 300′ to 600′ with an estimated average depth of 310′ of workable ore. The capping, of leached country rock, carrying unworkable copper values, ranges 50′ to 65′ in depth, with ore of workable tenor underneath for 300′ to 600′ depth, succeeded by monzonite too low in copper tenor to be workable.

The mine, while having a single ore body, is being developed both underground and open-cast, but is essentially a quarrying proposition, like the Rio Tinto and Granby. The underground mine, operated by the top slice caving system, eventually will be broken into open pits, and the entire mine worked open-cast. The mine openings are rectangular, laid out like the streets of a city, with blocks above blocks, like the successive floors of a building. There are 13 tunnels, entering the hills at approximately right angles to the gulch. These tunnels are avenues, and, crossing the avenues, at right angles, parallel with the gulch, are streets, these being opened 150′ apart. Paralleling the tunnels, or avenues, are drifts, corresponding to city alleys, these being 75′ on either side of the avenues. The tunnels are 10x10′, or larger, and all openings are of exceptionally large dimensions, connections between the various floors being secured by upraises from alley to alley. Stope levels are opened at intervals of 17′ and 25′. The avenues, streets and alleys are named on the same system as is used in the street nomenclature of Salt Lake City, and the underground mine, as a whole, has nearly 20 miles of openings, under about 40 acres of ground. Timbering costs are said to be less than 2 cents per ton of ore mined, and the mine has, blocked out, above the main tunnel level, about 25,000,000 tons of ore. The main working tunnel has a double tram-track, laid with 30-lb. rails, with an electric haulage system.

The open-cast workings are planned on a truly colossal scale, in magnitude comparable only with the greatest iron mines on the Mesaba Range of Lake Superior. Removal of both overburden and ore is by steam-shovels, and stripping was begun with steam-shovels, August, 1906, the capping ranging 50′ to 65′ in depth. For the third quarter of 1908, stripping averaged 87,000 cu. yds. of capping monthly, or at the rate of about 10 acres yearly, each acre being estimated to carry about 1,000,000 tons of payable ore. The ground must be blasted before removal by steam-shovel, and the method of mining followed provides for removal of ore in 60′ benches, in sections 40′ thick and 1,000′ long, each section carrying circa 180,000 tons of ore, requiring, for blasting, about 25 tons of dynamite, ground being broken at a cost of about 1¼ cents per ton. A single blast has torn down 15,000 tons of ore. Mining equipment, for open-cast operations, includes 7 Vulcan and Marion steam-shovels, of 70 to 90 tons weight each, 3 being employed in stripping and 4 for removal of ore.

For removal of ore and deposition of overburden, the company has 10 miles of standard gauge tracks, laid with 65-lb. steel rails, equipment including 5 locomotives, and 125 dump-cars of 6 cu. yds. capacity each. The waste rock from the capping is loaded on cars, and dumped down the cañon, on lands bought for the purpose.

At the end of 1908 the company estimated that there had been developed, on a 72-acre tract, an average of 1,000,000 tons of ore per acre, at an average depth of 310′, giving 72,000,000 tons of ore proven, sufficient for nearly 30 years production, on the basis of 2,500,000 tons of ore extraction yearly. The principal disadvantage of steam-shovel work lies in the mine being on both sides of a precipitous gulch, which causes the steam-shovel employed on stripping to run speedily into ore, the cuts being unpleasantly short, owing to the sharp pitch. This disadvantage is overcome, partially, by switchbacks, and in case

ious trouble there are alternative methods available for the removal of
rden and ore, these including the construction of a cog-line railway, to
of the ore body, to give access to the upper portion.
ining equipment includes a steam plant, with air-compressors and power
but, owing to ore extraction being mainly open-cast, and underground ore
secured through tunnels, the mining plant is smaller than may be found
ny properties having a tithe of the productive capacity of the Utah
r Co.
he company has had very poor service from the Rio Grande Western
d, which, holding the entire Bingham camp at its mercy, is inclined to be
hat dictatorial and dilatory. For this reason the Utah Copper Co.
d a charter, 1908, for the Bingham & Garfield Railway Co., and plans the
uction of a 20-mile railway line, from Bingham Canyon to Garfield, at an
ted cost of about $1,000,000.
he company has 2 mills, the first being near the mine, and the second,
is one of the greatest in the world, at Garfield Beach, 19 miles distant.
he old mill, remodeled 1908, of circa 900 tons daily capacity, was so
ed that it could be increased, by units, to circa 6,000 tons ultimate
ity, but the development at the mine rendering it probable that this
ity would be insufficient, a more extensive millsite was secured, on Great
Lake. The old concentrator, at Copperton, 1½ miles below Bingham,
es ore over a spur of the Bingham branch of the Rio Grande Western
ay, the railroad track entering the mill over a trestle, ore being dumped
ins beneath the track. The building is 193x327′ in size, of wood, sheathed
iron. Equipment incudes 2 Gates centrifugal crushers, 4 sets of rolls, 6
jigs, 4 Wilfley tables, 2 Overstrom tables, 2 Card tables, 52 slime tables,
ilean mills, 18 six-foot Frue vanners, 6 hydraulic classifiers, and 6 revolv-
creens. The crushing department, 26x44′ in size, has two 1,200-ton Gates
ers, and 2 sets of 36″ and 30″ Gates rolls. Ore is drawn from the bins,
gh chutes, to a 200′ belt-conveyor that carries ore to the crushers. The
r-house, 36x100′, has eight 75-h. p. boilers, with automatic stokers, and
. p., 150-h. p., and 350-h. p. engines.
The new mill is located on a 3,000-acre site, 4 miles east of the Garfield
ter and one mile east of the works of the Boston Consolidated, reached
a 8-mile branch of the Rio Grande Western railway. The mill is of steel frame,
ncrete foundations, with reinforced concrete floors, iron siding, and composi-
roofing. The mill is in two 3,000-ton units, of 6 sections each, giving a capacity
00 tons daily to each section. Each unit is 300x505′ in size, the two units,
their outlying buildings and yards, occupying about 20 acres, and the
t is so designed that two additional units can be constructed, whenever
red, giving the mill a daily capacity of 12,000 tons. Milling was begun
e, 1907, with 2 sections, and the 12th and final section of the mill was
ted circa November, 1908.
The ore-bins are of 30,000 tons capacity, there being bins of 23,000 tons
acity in the coarse crushing department, and of 7,000 tons capacity in the
crushing department.
Equipment of each section of the mill consists of 2 No. 7½ Gates crushers;
ets of 20x54″ rolls, of special design; 12 sets of 16x36″ rolls, of special
ign; 18 six-foot Chilean mills, of special design; 36 jigs, of special design;
No. 5 Wilfley tables, and 52 six-foot suspended vanners, of special type.
The 13,000-h. p. power plant, circa 2,000′ from the mills, has two 26x54x48″
is-Chalmers Corliss cross-compound condensing engines, direct-connected to
1,500-kw. alternating current generators, and three 32x70x48″
rdberg-Corliss cross-compound condensing engines, direct-connected to three
50-kw. alternating current generators. The boiler plant has twenty 600-h. p.

Heine water-tube boilers, working under 175 lbs. steam pressure, equipped with stokers having separate mechanical drives, of special design.

The machine-shop, 50x105′, of steel frame and brick walls, on concrete foundations, is thoroughly equipped for general repair work.

Water formerly was taken from the Garfield Water Co., but a sufficient supply has been developed on the company's own lands. The pumping plant, of 10,500 gallons capacity per minute, has one 12″ two-stage turbine pump, direct-connected to a 250-h. p. General Electric induction motor, with capacity of 2,500 gallons per minute; one 12″ two-stage turbine pump, direct-connected to a 350-h. p. General Electric induction motor, with capacity of 3,500 gallons per minute, and one 15″ two-stage turbine pump, direct-connected to a 450-h. p. General Electric induction motor, with capacity of 4,500 gallons per minute. These pumps force water, from a pond, through 2,000′ of 24″ pipe, against a head of 230′ to a 5,500,000-gallon concrete reservoir. There also is an auxiliary pumping plant, forcing water to a 500,000-gallon high-service concrete reservoir, 100′ above the main reservoir, this having 2 Worthington 8″ single-stage pumps, direct-connected to induction motors, with combined capacity of 1,500 gallons per minute.

The nature of the ore, which is mainly very finely disseminated chalcocite, necessitates fine crushing, which causes considerable sliming. The ore concentrates easily, but losses in tailings are heavy, having been, 1906, at the old mill, 0.50 to 0.75% copper, and, 1908, the mills treated ore partially oxidized, which did not give very clean extraction, but the mills should do better on ores mined from greater depth. The new mill was expected to put 18 to 23 tons of ore into one, giving concentrates averaging 26 to 30% copper and $6 to $10 combined gold and silver values per ton. For the first eleven days of August, 1907, the ore treated was said to have averaged 1.91% copper, by assay, with an extraction of 1.36%, or 27.2 lbs. fine copper per ton, with losses of 0.55% copper in tailings, giving a recovery of 71%. In May, 1908, the mill was putting about 23 into one, with a recovery of only about 67% of assay values, and in July, 1908, the mill was said to be making an average recovery of 23 lbs. fine copper per ton. The management hopes, eventually, to increase the extraction to 80% of assay values, but it seems doubtful if this can be done, with ore that slimes so readily, with such high concentration.

Production was 4,698,906 lbs. fine copper for calendar year 1906, and was 33,118,409 lbs. fine copper for year ending June 30, 1908. Production, 1908, was 8,527,939 lbs. for the first quarter, 11,568,390 lbs. for the second quarter, and 12,000,095 lbs. for the third quarter, with a total production of 43,689,875 lbs. fine copper for the year. These figures render it obvious that the mine has a productive capacity of about 50,000,000 lbs. fine copper yearly, with its present milling capacity of 7,000 tons per diem.

Costs were said, for August, 1907, to have been about 45 cents per ton for actual mining, or, with general administrative costs, taxes, etc., 68 cents per ton for mining. President MacNeill stated, early 1908, that mining costs, by steam-shovel, were about 25 cents per ton only. For the second quarter of 1908 net earnings were $493,694, on a production of 11,568,390 lbs. fine copper, made at an estimated average cost of 8.16 cents per lb. For the third quarter of 1908, net earnings were $501,391,60, with copper made at an estimated average cost of 8.73 cents per lb. These figures would indicate the ability of the company to make copper for an average cost under 10 cents per lb., and perhaps for 9 cents per lb., but the estimated average cost of 7 cents per lb. is not likely to be reached. Former estimated costs of $1.75 to $1.85 per ton of raw ore treated, apparently should be increased to $2 to $2.25 per ton, to allow a reasonable margin for safety, and, with an average recovery of 23 lbs. fine per per ton of ore treated, cost of finished copper would be 8.7 cents per lb.

asis of $2 cost per ton, or 9.8 cents per lb. on the basis of cost of $2.25 f ore. It is obvious, however, that while the Utah Copper Co. has not the extreme low cost predicted by its management, and scarcely seems do so, it has fully demonstrated its ability to make copper, at the 0,000,000 lbs. per annum, at a cost safely within 10 cents per lb., and g copper, beyond question, at a somewhat lower average cost than the of costs of the ten largest copper producers of the world, of which the w is one. The ore reserves of the mine are as nearly inexhaustible as any mine of any metal.

Utah Copper Co. has been well managed, and the original owners, con- with the United States Reduction & Refining Co., are regarded with vor, as thoroughly experienced and capable mining men, but the prop- suffered somewhat, in the eyes of conservative investors, through the ion of a heavy share interest, said, in some quarters, to constitute a by the Guggenheims, and suspicions of the possible future of the prop- under Guggenheim control, were aggravated by newspaper talk of this property with other Guggenheim interests, at Ely, Nevada, which would not be to the best interests of the shareholders of the Utah Co. Thomas W. Lawson apparently was sold a call on a large block of the Utah Copper Co., in 1908, and endeavored—at least ostensibly— t the shares, whereupon they immediately sold lower, this being the ffect of Lawson's endorsement of a mining property. The management led to commendation for giving quarterly reports that furnish valuable l information, and apprise shareholders of the manner in which their ts are being conserved.

DEVELOPMENT CO. **UTAH.**

ad. Was succeeded, circa September, 1908, by North Utah Mining Co. rly at Bingham Canyon, Salt Lake Co., Utah. Fully described Vol. VII.

& EASTERN COPPER CO. **UTAH.**

fice: 127 Church St., New Haven, Conn. Operating office: Herald Salt Lake City, Utah. Mine office: Dixie, Washington Co., Utah. office: Shem, Washington Co., Utah. Louis E. Stoddard, president; E. Graham, vice-president; T. W. Farnam, secretary and treasurer; pre- officers, E. G. Stoddard, W. D. Bushnell and Fredk. F. Brewster, direc- Chas. H. Doolittle, general manager. Organized Feb. 7, 1901, under laws est Virginia with capitalization $1,500,000, increased later to $3,500,000, $5 par, in $2,000,000 preferred and $1,500,000 common stock.

ands, 11 claims, patented, area 220 acres, and a 40-acre smelter-site, g lands including the old Dixie mine, in the Tutsagubet or Cave Springs ct, near Green River. Property shows 5 ore bodies, in limestone, one, of timated average width, carrying cuprite, azurite and massive malachite, g average assays of 15% copper. Principal development was by a 775' shaft, sunk from the breast of a 225' tunnel, but the shaft caved, June 1, and it was necessary to run a new tunnel, of 800', to reopen the mine. Old ngs were said to show about 100,000 tons of ore. The mine uses gasoline

he old 25-ton smelter, antiquated and poorly located, is idle. The new er, at Shem, has a 100-h. p. water-jacket blast-furnace, with water power, d from the Santa Clara river, circa 2 miles distant, and an auxiliary plant. The smelter is about 50 miles from Acoma, on the Rio Grande rn railway, the nearest shipping point, and transportation for 14 miles of istance, with a down-grade haul, is by traction engine.

roduction has been as follows: 1,448,597 lbs. fine copper in 1904; 400,166 n 1905; 391,779 lbs. in 1907. The property was closed down, October, *owing to depression in the metal market.* Notwithstanding lack of rail

A. F. Schneider, vice-president. Lands include the Blue Bird group, near the Hickory mine of the Majestic, having a 225′ main shaft.

UTAH SOUTHERN GOLD & COPPER MINING CO. UTAH.

Dead. Formerly at Milford, Beaver Co., Utah. Described Vol. VI.

UTAH SMELTING CO. UTAH.

Dead. Was succeeded, 1908, by Independent Smelting Co. Formerly at Bonneville, Box Elder Co., Utah. Described Vol. VII.

UTAH UNITED COPPER CO. UTAH.

Office: 222 D. F. Walker Bldg., Salt Lake City, Utah. Mine office: Milford, Beaver Co., Utah. Employs 4 men. John T. Treasure, president; A. J. McMullen, vice-president and general manager; Chas. A. Weaver, secretary; A. D. McMullen, treasurer; D. P. Rohlfing, engineer. Organized Sept. 1, 1908, under laws of Utah, with capitalization $600,000, shares $1 par, as a merger of Wasatch Mining & Milling Co., and Skylark Copper Mining & Milling Co. Annual meeting, second Tuesday in October.

Lands, 12 claims, 2 patented, area 240 acres, also a 10-acre millsite, in the Beaver Lake district, showing fissures and contact veins, in and between limestone and granite-porphyry, there being 3 ore bodies, estimated by company to range 20′ to 100′, 50′ to 200′ and 50′ to 300′ in width, of which one, traceable 6,300′, is opened by shafts of 30′, 100′, 150′, 310′ and 415′, and by 4 tunnels, longest 350′, estimated to show 50,000 tons of ore blocked out for stoping. Ore is oxidized to depth of 170′, and sulphide below. Ores are claimed to average 6.2% copper, up to 60% lead, 6 oz. silver and $15.40 gold per ton. Company plans continuous development.

UTAH-YERINGTON MINING CO. NEVADA.

Office: Provo, Utah. Letter returned unclaimed from former mine office, Yerington, Lyon Co., Nev. John Roundy, president; Jos. Wirthlin, vice-president; Heber C. Jex, secretary and treasurer; preceding officers, Heber C. Harris and Jack Cockrell, directors. Organized 1907, under laws of Utah, with capitalization $100,000, shares 10 cents par. Lands, 5 claims.

UTE COPPER CO. UTAH.

Office: Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. Thos. Weir, president; John Weir, Jr., vice-president; J. M. Burt, secretary and treasurer; preceding officers, Henry Catrow and N. J. Catrow, directors. Organized 1907, under laws of Utah, with capitalization $3,000,000, shares $5 par. Lands, circa 225 acres, patented, including the old Winnimuck mine, which was an important silver-lead producer in early days. Property is opened by the 900′ Weir tunnel, and is said to be developing through the tunnel of the Bingham-Butte Mining Co. Has an air-compressor.

UTICA & BISBEE DEVELOPMENT CO. ARIZONA.

Office: Utica, N. Y. Letter returned unclaimed from former mine office, Bisbee, Cochise Co., Ariz. Organized circa 1906, to take over the Erickson group, in Tombstone Cañon, northwest of Bisbee. Presumably idle.

UTICA MINING & MILLING CO. COLORADO.

Office: 1420 Chestnut St., Philadelphia, Pa. Mine office: Ward, Boulder Co., Colo. Ores carry gold, silver and copper. Has water power and a 20-stamp mill. Presumably idle.

UTOPIA MINING & MILLING CO WYOMING.

Mine office: Centennial, Albany Co., Wyo. Development is by a tunnel, said to show a 12′ vein carrying ore giving high assay values in gold, with fair silver and copper values.

COMPAÑIA MINERA DE LAS VACAS i LOS VILOS. CHILE.

Office: Valparaiso, Chile. Mine office: Petorca, Aconcagua, Chile. Organized Aug. 6, 1905, under laws of Chile, with capitalization 400,000 pesos, shares 10 pesos par.

ELSA COPPER CO., LTD. **ITALY.**
d. Formerly had an office at 123 Wellington St., Glasgow, Scotland.

Z-BOSTON COPPER CO. **ALASKA.**
ce: Alaska Bldg., Seattle, Wash. Letter returned unclaimed from mine office, Valdez Alaska. Lands are near the Alaska-Northwest Co.

O VALENCIA. **PERÚ.**
e office: Quichin, Camaná, Arequipa, Perú. Property, near the coast, ern Perú, has argentiferous copper ore.

CIA COPPER MINING CO. **CALIFORNIA.**
d. Formerly at Sherwood, Trinity Co., Cal. Fully described Vol. VI.

DAD VALENCIANO-ANDALUZA DE ALTOS **SPAIN.**
RNOS y MINAS DE PEÑAFLOR.
ce: Glorieta, 1, Valencia, Spain. Mine office: Peñaflor, Sevilla, Spain. ldomero Deu, president and agent. Capitalization, 1,500,000 pesetas, 250 pesetas par. Property is the Elvira mine and extensions, carrying and iron pyrites, at Peñaflor, and a group of claims, area 144 hectares, olo de los Infantes, Sevilla.

NSUELLA COPPER CO. **ARIZONA.**
ice: 3543 W. 23d Ave., Denver, Colo. Mine office: Quartzite, Yuma iz. Col. Richard Darling, president and general manager; F. W. Deiner, treasurer; Geo. C. Foulkes, secretary. Organized November, 1901, laws of Arizona, with capitalization $1,250,000, shares $1 par.
nds, 7 claims, patented, area circa 100 acres, also a 60-acre mill and r site, 12 miles southwest of Quartzite, 70 miles from the Southern railroad and 15 miles from steamer landing on the Colorado river, supeing received by water. Country rocks are limestone and schist, carrycontact veins, of fair size, developed by shafts of 200′ and 270′, with 1,300′ of workings, showing malachite, azurite and oxide ores, giving e assays of 12% copper, 4 oz. silver and $4 gold per ton. Has gasoline , with two 500′ hoists, 2 engine-houses, 18x24′ smithy, and 6 dwellings, 1,000′ artesian well. Has a 30-ton Vulcan water-jacket blast-furnace. Idle.

NTINE COPPER & GOLD MINING CO. **UTAH.**
ead. Formerly at Bingham Canyon, Salt Lake Co., Utah. Described Vol. VI.

NZUELA COPPER MINING CO. **ARIZONA.**
ffice and mine: Benson, Cochise Co., Ariz. Organized 1907. Lands, 25 miles northwest of Benson, near the San Domingo mine of the Hub g & Investment Co., are said to show extensive outcrops of self-fluxing r ore.

EO MINING CO. **UTAH.**
Office: care of Hon. Thomas Kearns, general manager, Salt Lake City, . Mine office: Park City, Summit Co., Utah. J. P. Boyle, superintendent. auriferous and argentiferous copper ores. Idle.

ERIE MINE. **YUKON**
Mine office: White Horse, Yukon, Canada. Arthur D. Palmer, owner and ger. Mine, circa 3 miles southeast of the Arctic Chief, has a 100′ shaft, 18′ vein said to carry ore averaging about 10% copper. Has shipped a high grade sulphide ore. Employs circa 15 men.

ÉTÉ ANONYME FRANÇAISE DES MINES **SERVIA.**
DE CUIVRE DE VALIEVO.
Office: 13 Rue Rougemont, Paris, France. Mine office: Rebelj, Valievo, a. M. Ducos, president; A. Bevelley, vice-president. Organized Jan. 10, under laws of France, with capitalization 2,000,000 francs, shares 100 s par. *Debentures, 50,000 francs, at 6%,* in bonds of 100 francs par.

COMPAÑIA MINERA BRONCES DE VALLENA

Office: Iquique, Chile. Mine office: Vallena ized Nov. 30, 1900, under laws of Chile, with capita 50 pesos par.

VALLEY MINING & MILLING CO.

Dead. Formerly at West Cliff, Custer Co., Col

VALLEY VIEW MINING CO.

Office: San Francisco, Cal. Mine office: Linc 90 acres, patented, showing impregnations 250′ w between schistose walls. Has a gossan outcrop, long, carrying average gold and silver values of ab has average about 5% copper. Has two 5′ Hun years.

VALLEY VIEW MINING CO.

Dead. Formerly at Anaconda, Deer Lodge Co

VALRUBIO GROUP.

Office: care of M. Yglesias, owner, 2 Tokenh Eng. Mine office: Paimogo, Huelva, Spain. P rubio, San Carlos and San Andres mines, with to lying between the Romanera and Monterubio group extensions of the San Vicente veins, is under lease

VALTARO COPPER MINES, LTD.

Office: 70 Queen Victoria St., London, E. C., Borgotaro, Parma, Italy. Marquis N. Melilupi, c aging director; A. Ireland, secretary. Organized Great Britain, with capitalization £120,000, shares

VAL VERDE COPPER CO., LTD.

Dead. Formerly at Humboldt, Yavapai Co., Ar

VAN ANDA COPPER & GOLD MINES CO., LTD.

Dead. Formerly at Van Anda, Texada Island, B

VAN BRITT COPPER CO.

Mine office: Planet, Yuma Co., Ariz. Orga Williams Fork River, are said to show ore giving of circa $80 per ton.

VANCOUVER & BOUNDARY CREEK DEVELOPMENT & MINING CO.

Dead. Formerly at Penticton, Boundary distri

VANCOUVER COPPER CO., LTD.

Office: 4 Sun Court, Cornhill, London, E. C., Sicker, Vancouver Island, B. C. J. Proctor, chair sulting engineer; W. Cooper, secretary; Edw. Stab ized Feb. 27, 1907, under laws of Great Britain, shares £1 par; working capital, £30,000. Debent bonds, at 6%, due July, 1912.

Lands include the Lenora mine, adjoining the tion of the Tyee ore bodies in a chute of 30′ to 40′ capping. Property includes the 5-mile Mount Si with 1,136 acres of right-of-way, sundry town lots Sicker hotel. Also holds, under bond and lease, Sidney Inlet, Vancouver Island, B. C., from which late 1907. Under former management the Lenor grades, first grade averaging 7.95% copper, 3.5 oz. ton, and second grade, which constituted about t averaging 1.3% copper and 0.015 oz. gold per ton.

n 1,700 tons of ore, carrying about 140,000 lbs. fine copper. Property
ed promising.

UVER ISLAND COPPER CO., LTD. **BRITISH COLUMBIA.**

e office: Sidney, Vancouver Island, B. C. Organized 1907, under laws
h Columbia, with capitalization $100,000, shares $1 par. Lands are at
nlet, in the Clayquot division of the Alberni district, Vancouver Island,
s said to have contracted for a 200-ton Riblet aërial tram, to connect
bunkers at tidewater.

UVER ISLAND MINING & **BRITISH COLUMBIA.**
VELOPMENT CO., LTD.

e: 45 Leadenhall St., London, E. C., Eng. Mine office: Duncans,
er Island, B. C. F. H. Faviell, chairman; J. I. Fifield, secretary. Or-
Nov. 18, 1902, under laws of Great Britain, with capitalization £50,000,
l par; issued £35,895. Lands, circa 1,800 acres, apparently held under
ption, lying mainly east of the Tyee and supposedly carrying the east-
nsion of the Tyee. The Westholm has a 510′ two-compartment shaft,
t of known occurrence of ore in the Tyee, and has about one-half mile
ngs, showing, on the 500′ level, a wide mineralized zone with occasional
ations of 3 to 10% copper tenor. The Blue Bell has a 110′ shaft, from
carloads of ore, shipped 1906, gave returns of 5 to 8% copper.

UVER RAILWAY SYNDICATE, LTD. **BRITISH COLUMBIA.**

d. Property sold, February, 1907, to Vancouver Copper Co., Ltd.
at Mount Sicker, Vancouver Island, B. C.

I MINING CO., LTD. **BRITISH COLUMBIA.**

e: Salisbury House, London, E. C., Eng. Mine office: Rossland,
trict, B. C. Lord Ernest Hamilton, chairman; preceding officer, F. C. D.
, A. B. Deablo and H. W. Morrison, directors. Organized July 9, 1908,
ws of Great Britain, with capitalization £34,500, in 30,000 preference
l 1s. par. Property is the Vancouver group, 8 claims, 1 fractional, in
an district, carrying mainly silver-lead ores.

& HUGUET. **ALGERIA.**

e office: El Miliah, Philippeville, Algeria. Property is the Achaiches
hich, in 1905, employed 47 men. At last accounts planned to smelt
ne mine. Presumably idle.

PROPHET COPPER CO., LTD. **ARIZONA.**

d. Formerly at Clifton, Graham Co., Ariz. Described Vol. VI.

MINING CO. **ARIZONA.**

e: Tucson, Ariz. Mine office: Vekol, Pinal Co., Ariz. Employs
men. Maj. E. S. Garnett, president; J. V. Neuhaus, vice-president;
tton, treasurer; S. J. Garnett, secretary; Wm. Forbach, superintendent.
ds, 42 claims, said to have been bought for circa $200,000, in the Vekol
ns, about 35 miles southwest of Casa Grande. Lands include 6 old
s, dating from 1881, with about 6 miles of workings, said to have
, in the past, circa $3,000,000 in silver and lead, and the old ore dumps
to contain 350,000 tons of second grade ore that probably can be
t a profit. The old mines shipped some ore carrying up to 4,000 oz.
r ton, with considerable lead and a small amount of copper, with
dications of increased copper values at depth. The mine has a new
-compartment shaft, said to show good ore.
ipment includes steam power, air-compressor and 3 hoists, one good
′ depth. Buildings include a smithy, machine-shop, carpenter shop,
d laboratory. The mill is of 40 tons rated daily capacity. Property
ed promising.

DEÑA MINING & SMELTING CO. **MEXICO.**

e: 71 Broadway, New York, N. Y. Mine and works office: Velar-

deña, Cuencamé, Durango, Mex. Wm. C. Potter, chairman executive committee; H. M. Moran, general manager; Wm. Davey, mine superintendent; W. H. Foster, smelter superintendent. Is controlled, through ownership of 60% of capital stock, by American Smelters Securities Co.

Lands, 2,500 pertenencias, area 6,177 acres, including the town of Velardeña, with a population of 5,000. Lands include the Terneres and Santa Maria silver-lead mines, the Copper Queen mine, carrying argentiferous copper ores, and a number of smaller properties. The mines, first opened circa A. D. 1650, were worked originally for silver-lead carbonates, succeeded at depth by zinciferous and cupriferous silver-lead sulphides.

The Copper Queen, or Reina de Cobre mine, also known as El Cobre mine, is 27 kilometers by rail from Velardeña, and the ore is mainly copper, said to average about 3% copper and 250 grams silver per ton, though there is considerable silver-lead. Ores, as developed in this property, are mainly oxidized, and normal production is 400 to 500 tons daily of low grade ore.

The Santa Maria mine, at Velardeña, is opened by numerous shafts, and production is 100 to 500 tons daily of silver-lead ore.

The Terneres mine is said to have produced $22,000,000 worth of ore before coming under the present ownership. Development is by a 600′ main shaft, showing good ore in the bottom, and by a main tunnel with electric haulage. The property has about 25 miles of workings, and production, mainly copper ore, though with considerable silver-lead ore, amounts to about 400 tons daily. The Terneres has an aërial tram to Velardeña.

A 1,200-h. p. central power plant has steam power and gas producers, also a complete electric plant, with power generated partly by water, but mainly by steam and gas engines. Equipment includes electric hoists and electric air-compressors.

Buildings include necessary shops, offices and a considerable number of dwellings for employes.

The company has a private narrow-gauge railroad, known as the Ferrocarril Velardeña, of about 20 miles length, connecting the mines and smelters, the principal branch being a 29-kilometer line from Velardeña to the Copper Queen mine. The company also plans an aërial tram from the mines to the new smelter, 8 miles distant.

The concentrator, rated at 200 tons, may be increased to 500 tons daily capacity.

The reduction works include two smelters, the oldest being antiquated and out of commission.

The new smelter, blown in 1907, is about 4 miles from Pedricefia, on the Mexican National Railway. This has three 150-ton lead furnaces and three 250-ton copper furnaces, with room for an additional copper cupola. There are twelve 250-ton charging-bins, surmounted by a movable electrical steel bridge, for distribution of charges, charging-cars being loaded automatically from the bins, and hauled to the charge-floor by electric locomotives. Each blast-furnace has an elliptical double brick-lined settler, 4x12′ inside measurement, and slags are handled by 10-ton cars, hauled by electric locomotives. There are extensive dust-chambers and flues leading to a 230′ brick stack. A briquetting plant handles flue-dust and fines. The works have no converter, matte being shipped to the Aguascalientes smelter for reduction. The lead smelter includes 5 Godfrey roasters and 5 Huntington-Heberlein converters for the desulphurization of lead sulphides, with a capacity of 125 tons daily.

OLIVERIO L. VELASCO y CA. MEXICO.

Office: Apartado 953, Mexico, D. F. Mine office: Chichihualco, Be— Guerrero, Mex. Oliverio L. Velasco, general manager. Property is [illegible]

ine, carrying gold, silver and copper ores. Employed circa 75 men at unts.

É ANONYME DES MINES DU VELAY. **FRANCE.**
e: 19 Rue Dubois, Lyons, France. Mine office: Azerat, Brioude, ire, France. Organized June 30, 1906, under laws of France, with ation 400,000 francs, shares 100 francs par.

É MINIÈRE DE VELEZ RUBIO. **SPAIN.**
e: 43 Rue de Courcelles, Paris, France. Mine office: Velez Rubio, Spain. Organized Feb. 14, 1902, under laws of France, with capital- ,500,000 francs, shares 100 francs par.

T-PORTLAND MINE, LTD. **BRITISH COLUMBIA.**
l. Reorganized, Nov. 18, 1905, as New Velvet Portland Mine, Ltd. at Rossland, Trail district, B. C. Fully described Vol. V.

T (ROSSLAND) MINE, LTD. **BRITISH COLUMBIA.**
l. Merged, January, 1904, in Velvet-Portland Mine, Ltd Formerly at , Trail district, B. C.

COPPER CO. **MEXICO.**
l. Formerly at Soyopa, Ures, Sonora, Mex.

MINING CO. **WASHINGTON.**
er returned unclaimed from former mine office, Orient, Ferry Co., Wash. her New, superintendent. Lands, 3 miles south of Orient, are opened l and an incline shaft showing auriferous copper sulphides.

RE HILL MINING CO. **ARIZONA.**
e and mines: Jerome, Yavapai Co., Ariz. Thos. E. Campbell, president eral manager; Geo. H. Avery, vice-president and superintendent; Avery, secretary; Frank E. Jordan, treasurer. Organized 1900, under Arizona, with capitalization $3,000,000, shares $1 par. Lands, 6 pat- ims, area 110 acres, 2 miles south of Jerome, showing 2 fissure veins, by company to average 90′ width and to carry average value of 4.7% .5 oz. silver and $4 gold per ton, in oxide and sulphide ores, which is an nate, developed by shafts of 65′ and 87′, and tunnels of 205′ and 457′. nds and idle several years.

APEX COPPER MINING CO. **ARIZONA.**
e: 3 West Main St., Bloomsburg, Pa. Letter returned unclaimed from ine office, Jerome, Yavapai Co., Ariz. Chas. B. Lutz, president and ; Jas. H. Mercer, vice-president; M. P. Lutz, secretary. Organized th capitalization $3,000,000, shares $1 par. Property was sold by 906, but redeemed by president for benefit of shareholders Lands, area circa 90 acres, in Mescal Gulch, about 2 miles south of Jerome, leveloped by 2 tunnels and a shaft. Idle since circa 1904, and appar- ribund.

CHIEF COPPER MINING CO. **ARIZONA.**
: 1616-20 Broad St., New York, N. Y. Mine office. Jerome, Co., Ariz. Chas. L. Tompkins, president; Dr. W. E. Delabarre, vice- ; Frank K. Kohler, secretary and treasurer; R. H. Smith, assistant and treasurer. Organized June 29, 1900, under laws of Arizona, with ation $3,000,000, shares $1 par. Annual meeting, first Monday in July. s, 13 claims, area 260 acres, in the Verde district, 7 miles south of including the Carrigan & Gadette group, in Mescal Gulch, adjoining atra, having circa 1,700′ of workings, showing auriferous and argen ulphides. The Paragon group, 3 patented claims, has tunnels of 135′, 1,066′, the 150′ tunnel showing ore. Diamond drilling is said to n unsatisfactory results, and option on lands held by Lloyd C. Haines *xercised. Idle.*

VERDE CONSOLIDATED COPPER CO. ARIZONA.

Office: Prescott, Ariz. Mine office: Jerome, Yavapai Co., Ariz. T. E. Campbell, secretary and treasurer. Capitalization $1,500,000, shares $1 par. Lands, 6 claims, 2 miles south of Jerome. Idle several years.

VERDE GRANDE COPPER CO. ARIZONA.

Office: 252 Grant Bldg., Kansas City, Mo. Mine office: Jerome, Yavapai Co., Ariz. Hon. I. H. Kinley, president; Wm. A. Forrester, vice-president; M. J. Beirn, Jr., secretary; John McQueeney, treasurer; R. A. Smith, assistant treasurer; J. C. Scott, superintendent; preceding officers, Thos. Taylor, Jos. Larsen and R. B. Kirwin, directors. Also has an advisory board, of Jerome mining and business men. Organized September, 1906, under laws of Arizona, with capitalization $8,000,000, shares $1 par.

Lands, 10 claims, area 120 acres, partly patented, about one mile south and west of the United Verde, on the southern slope of Smelter Hill, the United Verde being on the opposite slope, lands being located on a precipitous hill, with poor roads. Development is by 3 short tunnels and a 720′ two-compartment main shaft on the Little Daisy claim, planned to be sunk 1,000′, sunk in slate and schist showing scattering copper sulphides carrying good gold and silver values, ore occurring mainly in schist. Management believes that lands carry the extension of the United Verde ore body. Equipment includes a 60-h.p. hoist and Rand air-compressor, with bunk-house, eating-house and smithy. Company plans a smelter, but should open a mine first. Work has been pushed vigorously.

VERDE GRANDE COPPER CO. MEXICO.

Office: 308 North 6th St., St. Louis, Mo. Operating office: Apartado 98, Hermosillo, Sonora, Mex. Mine office: Ures, Sonora, Mex. J. L. Simmerman, president; Wm. A. James, first vice-president; G. P. Hammer, second vice-president; Thos. Tyson, secretary; R. D. Wood, treasurer; Jairus D. Fresh, general manager; Jas. Penman, superintendent. Organized 1901, under laws of Arizona, with capitalization $2,500,000, shares $5 par.

Lands, 500 acres, in the Ures district, circa 40 miles northwest of Hermosillo, partly timbered with ironwood, cottonwood and mesquite. Main tract of 460 acres includes La Verde Grande, La Cobriza and San Luis groups, claimed to show veins of 10′ to 100′ width, with widest vein lowest in grade. The Verde Grande group has contact deposits in limestone, near igneous intrusives, giving ores assaying 6% copper, 6 oz. silver and $1 gold per ton. La Verde and La Cobriza groups have a contact vein, between granite and quartzite, claimed to be of 30′ to 60′ width, and traceable 7,000′, carrying argentiferous and auriferous ore, assaying 5.5 to 16% copper, with gangue of talcose limestone, said to be interstratified with granite and quartz. Property as a whole has 6 shafts and tunnels, with nearly one mile of workings, claimed by management to show 200,000 tons of ore.

The smelter, 1½ miles from the prinicpal workings, completed 1904, has a 100-ton Allis-Chalmers water-jacket blast-furnace, but company claimed that coke was too expensive and installed a 30-ton Medbury furnace, burning charcoal, made in 3 kilns, from ironwood and mesquite, claimed to be made for 16 pesos per ton. The management reported, Apr. 24, 1906, that "on account of the exceeding hardness of the charcoal, and in order to reduce the speed necessary of the pulverizer, they would add additional machinery which would considerably reduce the power at present required to run the machinery, and thereby lessen the expense of refining the ore." Any managment that finds it difficult to pulverize charcoal should be set to pounding sand, as the next easiest job. At last accounts, June, 1908, the management explained to shareholders, who seemed a trifle disappointed, at the lack of long-promised dividends, that the proposition, as developed, was truly magnificent, but that, owing

prices of copper, it was necessary to tap richer veins, and it was found ıry to develop sulphide ores, the management explaining that sulphur is and sulphide ores the least refractory in reduction.

om December, 1907, to June, 1908, production was 51,181 lbs. black , of 95 to 96% tenor, 4,021 oz. silver, and 16 oz. gold, sold for 12,495

leaching plant was being installed, 1904, but nothing has been heard recently, and presumably it was a failure, like everything else tried by mpany. At last accounts the company was considerably in debt, to l large shareholders, who had advanced funds to keep the property going. lvertising of this company has been utterly untruthful, though the present gement apparently is not the one that promoted the corporation, hence not be held responsible for its bad start, but the methods of develop- and operation employed have been vacillating and inefficient from the ning, and the company's metallurgical efforts are ridiculous.

DE KING COPPER CO. **ARIZONA.**

Dead. Formerly at Jerome, Yavapai Co., Ariz. Fully described Vol. VI.

DE MINING CO., LTD. **IDAHO.**

Mine office: Osburn, Shoshone Co., Idaho. L. J. LePage, president; J. E. ver, vice-president; W. G. Lefever, treasurer; A. L. Williams, manager; ding officers and C. C. Gillen, directors. Organized September, 1906, with alization $1,000,000, shares $1 par. Lands, 12 claims, in McFarren Gulch, les from Osburn, adjoining the Gray on the southwest. Has a shaft and el, showing ore assaying up to 6% copper, 11% lead and 25 oz. silver on.

DE MINING & MILLING CO. **WYOMING.**

Office: 523 Bee Bldg., Omaha, Neb. Letter returned unclaimed from er mine office, Battle, Carbon Co., Wyo. C. M. Jacques, president; J. E. her, secretary and treasurer; G. F. Hinton, general manager; preceding ers, G. H. Lyons and A. H. Crow, directors. Lands, 4 claims, area 80 acres, ving a 35′ fissure vein, carrying malachite, bornite and chalcopyrite, giving ys of 5 to 21% copper, 6 oz. silver and $5 gold per ton, opened by shafts 0′ and 115′. Has a 40-h. p. steam plant. Idle several years and apparently ibund.

RDE QUEEN COPPER CO. OF ARIZONA. **ARIZONA.**

Dead. Succeeded, December, 1906, by Jerome Verde Copper Co. Formerly Jerome, Yavapai Co., Ariz.

RDE RIVER COPPER CO. **ARIZONA.**

Office: care of Geo. Hundinger, secretary, Newport, Ky. Mine office: ome, Yavapai Co., Ariz. Lee Pfau, president; C. M. Werk, vice-president; nuel Leonard, superintendent. Organized with capitalization $2,500,000, res $1 par, as a merger of the New England-Arizona Mining Co. and Pfau d Mining & Reduction Co.

Lands apparently 35 claims, in the Cherry Creek district, circa 9 miles th of Jerome, including the Pfau group of 10 claims, area 200 acres; the w England-Arizona group of 17 claims, and a new group of 8 claims, carry- fluxing ore and timber, about 5 miles east of the Pfau. The New England- zona mine, 2 miles from Turkey, has a number of shallow shafts and short nels. The Pfau mine has several thousand feet of working, with steam ver and a 100-ton concentrator. Company is not regarded with especial or.

ANCISCO VERGARA I. **CHILE.**

Office and mine: Petorca, Aconcagua, Chile. Property is El Mauro mine, ned 1860, and El Mauro smelter, making circa 225,000 lbs. fine copper rly, *when working. Idle several years.*

VERMONT & ARIZONA COPPER CO.

Office: 150 College St., Burlington, Vt. Let former mine office, Tombstone, Cochise Co., Ari president; C. G. Norris, vice-president; J. H. McL preceding officers, W. H. Varnum, C. H. Steve Cheney, Dr. D. C. Hawley and Hon. W. T. Smith, intendent. Organized July 25, 1899, under laws o $1,500,000, shares $5 par.

Lands, 11 claims, area 220 acres, 4 miles fr district, on the western slope of the Dragoon M silver veins and several copper veins, latter givi selected carbonate ores. Development is by a 1,500′ of workings, there also being about 1,000′ claims. Company claims to have developed a lar ore. Equipment includes steam power. Idle and

VERMONT & BOSTON MINING CO.

Dead. Formerly at Berkshire, Franklin Co.,

VERMONT COPPER CO.

Office: 43 Exchange Place, New York, N. Y ford, Orange Co., Vt. F. A. Berthold, secretary. laws of Arizona, with capitalization $1,000,000 Copper Co.

Property is the old Elizabeth mine, opened 17 in making copperas. It being found, eventuall average of about 3% copper, in the form of chal rhotite, the Elizabeth became the largest Americ to the opening of the rich mines of Lake Superior in foliated micaceous schists, the lenses overlapp tom. Main ore body at the Elizabeth has been at one point was 100′ wide. Main tunnel is 1,340′ by present management to have about 300,000 ton includes a steam plant and small smelter, also a land magnetic separation process. Nearest railro Maine. A dam has been started, to develop hy pany plans a 300-ton smelter. Mine was reopened of present company.

VERONA MINING CO.

Mine office: Bingham Canyon, Salt Lake renougue, manager. Development is by a 300′ tu

VERONICA COPPER MINING CO.

Dead. Presumably succeeded by Butte & V Silver Bow Co., Mont.

AKTIESELSKABET VESTERDALENS KOBBE

Office: Melderstein, Sweden. Mine office: N Nordlund, chairman; August Siljeström, super under laws of Norway. Production, 1902, was 1 tons second grade ore, containing circa 375,000 circa 60 men at last accounts.

VETA GRANDE MINING CO.

Dead. Formerly at Bacoachi, Arizpe, Sonora,

VETA GRANDE MINING CO.

Dead. Property included the Bertha, Carolin ing auriferous and argentiferous copper ore, with was manager. Former office was Mills Bldg., San Altar, Sonora, Mex.

ANDE MINING & MILLING CO. **COLORADO.**
and mine: Steamboat Springs, Routt Co., Colo. Lands, on Copper
niles from Steamboat Springs, have a 177' tunnel, cutting a vein of
ted width, carrying good gold values.

CA SILVER & COPPER MINING CO. **MEXICO.**
Formerly at Charcas, Moctezuma, San Luis Potosí, Mex.

N-ELY EXTENSION COPPER CO. **NEVADA.**
Was organized circa 1906, with capitalization $1,000,000, shares $1
nerly at Ely, White Pine Co., Nev.

N-ELY COPPER CO. **NEVADA.**
Lands sold, circa 1907, to Cumberland-Ely Copper Co. Formerly
hite Pine Co., Nev.

N. MINE. **NEVADA.**
d by Cumberland-Ely Copper Co.

-THOMPSON MINING CO. **MEXICO.**
Succeeded by Thompson-Lehmer Mining Co. Formerly at Ocotlán,
[ex. Described Vol. VI.

VIN MINING CO. **NEW MEXICO.**
office: Hachita, Grant Co., N. M. Organized 1908. Lands are on
ck of the King mine.

& BELLE CROWN MINING CO. **ARIZONA.**
office: Salome, Yuma Co., Ariz. John B. Martin, president and gen-
ger; F. C. Piper, vice-president; J. H. Matteson, secretary and treas-
eding officers, J. E. Matteson, T. H. Finnegan, W. E. Enos and R. R.
, directors. Lands, 7 claims, in the Harcúvar Mountains, circa 8
h of Salome, opened by a 100' tunnel, showing a 5' vein with a 3'
and a 150' shaft showing a 7' vein with a 30" paystreak assaying
copper and $15 to $20 gold per ton.

BONANZA MINING CO. **CALIFORNIA.**
Formerly at Dos Palos, Merced Co., Cal.

CONSOLIDATED MINING CO. **IDAHO.**
office: Wallace, Shoshone Co., Idaho. E. P. Spalding, general
Has silver-lead and argentiferous copper ores.

CONSOLIDATED MINING CO. **UTAH.**
office: Eureka, Juab Co., Utah. Vivian McCune, general manager;
eloar, superintendent. Lands include the Victor, Boss Tweed and
es, carrying gold, silver and copper ores. Has steam power. Produc-
, was only 4 carloads of ore.

COPPER MINING CO. **ALASKA.**
office: Ketchikan, Alaska. Lands, on Seal Bay, Gravina Island, 12
n Ketchikan, are slightly developed by tunnel.

SCHAFT VICTORIA BLEIERZ- UND **GERMANY.**
BLENDE GRUBEN.
; Köln, Germany. Mine office: Nassau a/L., Rheinprovinz, Ger-
ands, 370 hectares, carrying silver, lead, zinc and copper ores.

A BOULDER MINING CO. **COLORADO.**
office: Salina, Boulder Co., Colo. Ores carry gold, silver and copper.
power. Presumably idle.

A CHIEF COPPER MINING & SMELTING CO. **NEW MEXICO.**
; 100 Broadway, New York, N. Y. Mine office: Engle, Sierra Co.,
l. Robt. R. Hopper, president; Stephen J. Macy, vice-president; W. H.
eneral manager; J. H. Bigelow, secretary and treasurer; preceding
m. Buchanan, Henry G. Munger, Eugene S. Neal, Howard Clinton
and Dana A. Rose, directors. Organized 1906, under laws of Ari-
capitalization $3,000,000, shares $1 par.

assay up to 25% in copper tenor. Management claims to h
considerable body of 20% ore, carrying copper, gold and silv
statement is not credited. Wm. A. Farish is said to have s
1906, that the mine could feed a 100-ton smelter with ore of
of 15% tenor, which also is doubted.

The property was bought of the defunct Black Peak C
at sheriff's sale. The only work of importance is by 2 tunne
sional ore chutes up to 10′ in width, and 50′ to 100′ long. Th
are shallow, and confined to quartzite. There is a 500′ tunn
claim, said to give ore returning average assays of 20% copp
and silver per ton. The property was said, March 11, 1908,
workings. The property is 12 miles from Engle, to which a
been built, supplies having been packed in previously.

The company is said to have ordered, November, 1906
pressor, 3 rock-drills and a 32-h. p. gasoline engine. Buildin
eral store, and the company was said, 1907, to be building a fi
and to be making wax models of the mountains.

The company was said to plan a $250,000 smelter, whi
height of folly, until ore is developed. A small amount of o
claim was shipped, by burro, some years ago, by former own
ent company shipped a carload of ore, 1907, to El Paso smelt
copper.

The company claims to be free from debt, with lan
claimed to have $75,000 in the treasury, which is considered
said to have started a national bank at Engle. In October, 1
was selling stock at 75 cents per share, with guaranty t
within 6 months, at 6% interest, if the purchaser were dissa
pany was financed by Hopper & Bigelow, junior member of
woman. There has been some litigation over titles, said by c
serious. Though asked repeatedly, company has failed to fu
statements. The company claimed, in its advertisements, to
of 20 acres each, which was untrue, as the "mines" were m
company claimed, in its advertisements, that its mine was loc
"that has demonstrated, beyond doubt, the greatest possi

\$25 par; paid in, \$12. Has called an assessment of \$1, pay-
09, last preceding assessment having been \$1, August, 1905.
07, after deduction of construction charges, were \$13,837.38.
1908 with quick assets of \$68,074.23, and bills payable of
g a balance of assets of \$48,666.53. Shares are listed on the
xchange. First National Bank, Boston, registrar. Annual
Monday in February.

acres, including 2,289 acres mining lands, in Sections 19, 20,
own 50 North, Range 39 West, and Sections 24, 25 and 36,
Range 40 West, in Ontonagon county, Michigan, giving a tract
width of 2 miles east and west, and an extreme length, north
miles, lying just west of the Ontonagon river, practically all
lt, only about 100 acres lying on the Eastern Sandstone. The
the western extension of the amygdaloidal bed under develop-
e Copper Co. Neighboring mines, all idle for many years, are
sota on the north, National on the east and Devon on the
ctive property is the Michigan, 3 miles northeast. Litigation
vided interest in 320 acres of land, in the main mine tract,
a verdict of \$9,647.70 damages against the company. The
mbered, with an inexhaustible supply of good sandstone for
. Nearest railroad is the Chicago, Milwaukee & St. Paul, at
s distant.

empt at Lake Superior copper mining, in historic times, was
now Victoria property, in the winter of 1770-1771. The next
in 1849, when the property was opened, under the name of
of prehistoric pits containing masses of native copper, one
s of a ton. Name was changed, 1850, to Forest, and the prop-
ized, 1858, as Victoria Mining Co. Under these titles the
6 tons 1,279 lbs. fine copper, at a loss of about \$180,000. The
as burned by a forest fire, and the second was swept away by
perty was operated regularly, on a small scale, 1849-1855, and
odically. The mine was unwatered in 1881, but remained idle
egun, March 1, 1899, by present company.

located on a high and steep hill, notwithstanding which the
red with heavy sand and clay drift. The Forest amygdaloidal
e mine is opened, is 5′ to 30′ wide, with an average width of
regular in width, rolling in dip and bunchy in contents, with
66° E., and average dip of 61° to the northwest, the
out 1½ miles of outcrop on Victoria lands. The Forest bed
of the cupriferous amygdaloids of the Evergreen belt, opened
by the Mass and Adventure, but which one of the series is

had 4 shafts, numbered from east to west, opened erratically,
levels at various intervals, lifts being opened at distances of
spirit moved. Old No. 2 shaft, chosen for new operations,
2-compartment size. The formation is much disturbed near
the lode is irregular in dip, with widening noted at depth, and
ar walls. Some good stoping ground is shown from the 7th
until near the bottom, where the bed widens to about 80′,
casional bunches of copper. The Forest amygdaloidal bed is
fairly regular in copper contents, showing a little heavy cop-
values mainly in medium grade stamp-rock. All levels down
connected by winzes, giving ventilation and safety. The
ell and the mine is without timber, except in the shafts.
ons of stamp-rock have been developed. The copper chu'

rakes to the southwest, and the best ground, below the 15th level, has been found in the southwestern drifts. The mine operates 18 power drills.

In addition to productive openings, on the Forest lode, the mine has about 3,000′ of crosscuts, showing sundry cupriferous beds, but none of promise equal to the Forest. The footwall crosscuts show an amygdaloid underlying the Forest at an average depth of only 6′, this bed being well mineralized for 4′ to 5′ along the footwall, producing small masses up to 50 lbs. weight, the copper occurring mainly on the foot, with considerable epidote on the hanging-wall. Underlying this epidotal bed, at a distance of circa 60′, is a 6′ amygdaloid, showing much epidote and allied minerals, and a little stamp-rock. An amygdaloid called the Glenn, opened 1900, gave a fair showing of copper at the bottom of a shallow shaft. Diamond-drill borings north of the mine have shown nothing of special promise. The mine has crosscut tunnels of 780′, 150′ and 419′, and some work was done, 1908, in a tunnel on the side of a bluff near the river, where a lode carrying some copper was cut.

No. 1 shaft, which is 240′ east of No. 2, is an old opening, remaining from a previous management, and is 188′ deep, and idle.

No. 3 shaft, 1,190′ west of No. 2, also is an old shaft, of 350′ depth, and is idle.

No. 4 shaft, also an old opening, is only 180′ in depth, and also is idle.

No. 2 shaft, 8x12′ inside measurements, with 2 compartments, is 2,089′ deep, bottomed at the 22d level, with levels opened at 100′ intervals below the 4th. The mine has 29,563′ of workings, estimated to show 400,000 tons of stamp-rock, with 300,000 tons blocked out for stoping. The east drift, on the 22d or bottom level, showed some good ground, but the west drift was in poor ground continuously, during 1908. A crosscut, of circa 1,500′ length, sent south on the 19th level, has shown one amygdaloidal bed of some promise.

No. 2 shaft has a frame shaft-rockhouse, 34x40′, with a 16x36′ wing, and 90′ high. The power-house is 36x40′, with a 24x28′ wing, of wood on stone foundations, with steel roof. There is a 20x48″ Webster, Camp & Lane duplex-cylinder hoist, with single conical drum of 8′ minimum and 12′ maximum diameter and 11′ face, raising 4-ton skips, set on concrete foundation, bedded on rock. The old 12x28″ Nordberg hoist, with drum of 5′ diameter and 6′ 9″ face, rated at only 1,200′ capacity, was used for sinking No. 2 shaft to its full depth of 2,089′. Equipment includes two 12-drill Rand air-compressors and 20 rock-drills.

An exploratory shaft, started October, 1907, circa 2,600′ east of the present shaft, with 140′ deep, March, 1908, and a little drifting was done, meeting with small encouragement.

Buildings include a 30x60′ machine-shop, of wood, with iron roof, a 28x34′ carpenter-shop, 24x50′ smithy, 24x72′ warehouse, a 2-story frame boarding-house and office, 27x64′, with a 10x37′ wing, a 19x41′ frame schoolhouse, stone changing-house, general store and 58 dwellings, with a total of 80 buildings owned by the company. A 10x16x28′ storage cistern holds water from the mine for feeding boilers, and water for domestic use and fire protection is pumped, by a steel windmill, from a well having a storage tank and 750′ of water mains.

The company has a sawmill with a 56″ circular saw, furnishing timber and lumber for requirements of the property, which, 1907, sawed 262,956′ of lumber.

A large water-power has been developed from Glenn Falls, on the west branch of the Ontonagon river, about one mile from the mine, at a cost of $200,000. This is the best natural water-power of the Lake Superior copper district, the stream dropping nearly 150′ in 1½ miles, by a series of small falls, between which are numerous rapids, with sandstone bottoms. Power is developed by means of a dam, canal and shaft. The dam, built up from excava-

ock, is 320′ between abutments, and has 32 eighteen-inch "I" part, sunk vertically 5′ to 10′ in bedrock, with cement filling. an extreme height of 24′, with width of 14′ at the bottom and 8′ d has a 320′ main section, with wings of 100′ and 160′, giving a f 580′, built with an arch up-stream, giving great strength. The on the water side, with 5x10′ plates of ⅜″ steel, bolted to the ms through the concrete. The center of the dam has an apron a floating boom to guide logs, as the stream is used for logging dam being substantially built, so that it cannot be torn out by e outlet is a 44″ steel pipe, leading from the bottom of the dam anal. In order to insure an equable water supply a storage dam at the head of the river, near Lake Gogebic.

diverting water from the dam, nearly 6,000′ in length, runs 0′ through sandstone and 4,000′ through alluvium. On the bank s a pipe-line, providing compressed air for the removal of sand this being a novel form of dredging. The canal is 25′ wide at ide at the bottom and 16′ deep. The outlet of the canal has o sets, separated by a heavy concrete abutment. The gateways)″ "I" beams, set vertically 6′ apart, with 6 gates of heavy oak ted vertically by rack and pinion, actuated by water power. The rom the foredam, to 3 vertical inlet shafts, 19′ from center 5′ in diameter and 334′ 6″ deep, lined with concrete. The shafts ough solid sandstone, by means of 5″ holes bored to the required hich the 5″ holes were enlarged to 5′ holes, by reaming with a ving 4 cutting arms, each 30″ in length, actuated by a No. 9

rly was drawn into the shafts through 5,000 tubes of ⅜″ diam- e now is a single opening at the top of each shaft, air being ard, as bubbles, by the falling water. At the bottom of the a tunnel of 360′ length, leading to a large fan-shaped air-com- ber, 26′ in height, 18′ wide at the entrace of the tunnel and 60′ xtreme end, lined with boiler-plate. The imprisoned air, pulled fts by suction and swept along the tunnel in bubbles by the s, is released, in the compression chamber, and the constant resh air-bubbles, in myriads of millions, causes compression, the from escaping backward by the superior pressure of the falling lant was designed for an air-pressure of 123 lbs. per square inch, s pressure is exceeded, the air forces the water in the chamber ath of a 12″ vent-pipe, leading to surface. When, in operation ceeds 123 lbs. per inch, which it does speedily when the power is air rushes upward through three hundred feet of pipe with ree, carrying along with it some of the water which pulled it g a fine spray hundreds of feet in the air, with terrific roar. s to the contrary, the air-chamber is not leaking. The outflow would be called a tail-race if on surface, is sunk at an angle of to the lower river.

ulic-pneumatic power plant was completed May, 1906, and begun 00 to 5,000 h. p. under a full head of water, and has shown an 2%, under test. This plant is the most powerful single-unit air- existence, and was the fifth installation of the sort in the world. to operate one, two or three of the inlet shafts, if so desired, with variation of the energy developed. There has been some trouble of water, this being a difficulty that is faced by many power lent upon water. The simplicity and economy of the Victoria ie in its being absolutely automatic. No machinery is required,

the power being drawn off by a pipe, from pound of waste nor a gallon of oil is requi

The mine and mill are connected by a upper having a grade of 6% and the lower a at the top of the incline serves as a starte A retarding engine might be made to deve it not that the Victoria already has all th tically free, except for the interest on the line enters the mill over a 700' trestle.

The mill, near the hydraulic works, is crete foundation, equipped with an Allis-star 1908, increasing its capacity to circa 500 to machinery are of concrete beds, capping anchored by eye-bolts cemented into the r washing machinery and shafting, were brou mine. Washing machinery includes 28 Hart table taking middlings from the Wilfleys, mill was started June, 1906, and is said to 0.1%. Mineral is smelted by the Calumet &

Production has been as follows: 546,33 tons of rock hoisted and 95,035 tons of ro fine copper in 1907, giving an average produ copper per ton, secured at a cost of 15.8 c stamping circa 425 tons of rock daily, ma copper monthly, with an average return o mine, as a whole, is not looking especially cutting to the Eastern Sandstone, and, havi may be considered to have fair prospects promise than the present workings. The p the possession of the cheapest power imagina management.

VICTORIA COPPER MINING CO.

Mine office: Ashley, Uintah Co., U moribund.

VICTORIA GOLD & COPPER MINING CO.

Office: English Point, B. C. Mine offic Frank E. Starkey, president and general m tary and treasurer. Capitalization $1,000,000 lying west of Rossland. Idle several years a

VICTORIA MINE.

Mine office: Hornitos, Mariposa Co., C zone of schistose diabase between grano-dior 600' width carrying cuprite, malachite, azu ores, including those in the gossan, being m a considerable producer, circa 1865, employin

VICTORIA MINE.

Owned by Mond Nickel Co., Ltd.

VICTORIA MINING & SMELTING CO.

Office: 502 Main St., Joplin, Mo. Min N. M. Capitalization, $2,500,000. Lands, 2 eastern side of the Organ Mountains, of wh claims and 7 copper claims, yielding ore ass in copper tenor, with good silver values.

COMPAÑIA MINERA VICTORIAS DE CH

Office: Iquique, Chile. Mine office:

906, under laws of Chile, with capitalization 3,600,000 pesos, shares par.

MINING CO. **COLORADO.**

and mine: Grand Junction, Mesa Co., Colo. Organized 1907. Lands, n the La Sal district, said to give assays of $50 gold per ton from es.

MINING & SMELTING CO. **MEXICO.**

returned unclaimed from former office, Nogales, Ariz. Mine office: ea, Arizpe, Sonora, Mexico. J. L. Trauger, acting president; Paul retary. Organized May 9, 1905, under laws of Arizona, with capital ,000,000, shares $10 par, increased, 1907, to $1,500,000. Lands, circa orth of La Cananea, are said to show copper ore. Presumably idle.

COPPER MINING CO. **ALASKA.**

office: Ketchikan, Alaska. Patrick Heany, general manager. Com- id to plan driving a tunnel through a mountain.

ICUÑA. **CHILE.**

and mine: Higuera, La Serena, Coquimbo, Chile. Property is 5 l a smelter. The Champeta mine, opened 1855, the principal prop- he deepest in the district, showing a considerable number of parallel h a main vein of 5′ to 7′ width dipping at 60° to 80°. The oxidized about 70 meters depth, is followed by 30 meters of rich secondary succeeded by chalcopyrite of 10 to 15% reported average copper esumably after selection. The Panchita mine, opened 1850, is circa rs in depth. The San Ramón mine, opened 1851, is 270 meters in ving a vein of 4′ average and 15′ extreme width, carrying low-grade Cortada mine, opened to depth of 150 meters and length of 200 rizontally, shows a vein of 3′ to 4′ average width, ores of La Cortada Ramón averaging about 5% copper tenor only, rendering them unavail- resent, though of future promise. La Solitaria mine, opened 1893, is 0 meters in depth with slight development.

smelter, at Higuera, 18 kilometers from Totoralillo, the nearest rail- t, has 3 reverberatory furnaces, producing ejes of about 50% average nor. The Champeta mine in 1903 produced 11,950 metric tons of ore, 11% average copper tenor, and production of all properties, 1903, was lbs. fine copper.

GO VICUÑA. **CHILE.**

e and works: Huasco, Freirina, Atacama, Chile. Property is two El Astillero works, at Huasco, include a smelter and mill, latter a rock crusher and stamps. The smelter has 6 three-deck calcining and 3 reverberatory furnaces, burning imported coke, employing 93 average wages of 1.5 pesos daily, and, in 1903, smelted 3,085 metric ore averaging 4.85% copper, making bars of 96% copper tenor, with eraging 0.8% copper. Production, 1903, of this smelter, was 1,318,364 s fine copper.

jirio smelter, at Morada, 27 kilometers from Sarco, the nearest railroad has 2 reverberatory furnaces, producing ejes of about 50% average enor, with slags running 0.5% copper, employing 50 men, at average f 1.75 pesos daily. Carriage charges to railway are 6 pesos per metric l fuel is imported coke, costing 27 pesos per ton. Production, 1903, 29 tons of 15% ore, was 359,070 kilograms fine copper. Production, both works, was 3,698,291 lbs. fine copper.

i VIDELA. **CHILE.**

e office: Cerillos, Coquimbo, Chile. Property is the Hermanos mine, *pt for leaching mine waters, from* which 162 metric tons of precipitate

of 65% copper tenor were secured, 1903, and sold to smelter at Guayacan, equal to 233,044 lbs. fine copper.

VIELLA COPPER CO., LTD. S

Dead. Compulsorily wound up, February, 1903. Formerly at Huesca, Spain.

COMPAÑIA MINERA VIESCA y COAHUILA. MI

Mine office: San Juan de Guadalupe, Durango, Mex. Property is La Lune and La Estrella mines, carrying argentiferous lead and copp phides. Has steam power, employing circa 150 men, at last accounts.

VIGSNES KOBBERVAERKS AKTIEBOLAG. NO

Office: Talbodgaden 8B, Christiania, Norway. Mine office: Trondhjem, Norway. Property includes the Vigsnes and Stavanger, known as the Meraker mines, old properties opened to great depth, shaft being 2,410'. Properties were among the principal copper produ Norway, and were worked, 1865 to 1894, by a Franco-Belgian compan ducing 900,000 tons of cupriferous pyrites, production, 1895, having be long tons fine copper. Ore averages about 2% copper and 45% sulphu small quantities of ore of higher copper tenor. Has a hydro-electric plant, installed 1907, and about 10 miles of aërial trams, connecting th with a concentrator, built 1907. Company plans a production of circa tons of cupriferous pyrites yearly, beginning 1909.

VIKING COPPER MINING CO. WASHIN

Office: care of Frank P. Milcark, Spokane, Wash. Mine office: Ferry Co., Wash. Lands, 3 claims, 3 miles from Orient, near the N mine, in the Pierre Lake district. Mine has a vein of 125' claimed carrying low and medium grade auriferous copper ore, with a 50' sh a 400' tunnel, planned to cut the vein at depth of 930'.

VILLAGE BELLE GOLD & COPPER CO. COLO

Office and mine: Walden, Larimer, Co., Colo. David Hendricksor dent and general manager; M. C. Ward, vice-president. T. John Payn tary and treasurer; preceding officers, George Post and Thomas H. S directors. Organized July 16, 1902, under laws of Wyoming, with ca tion $100,000, shares $1 par. Lands, 4 claims, unpatented, reported by as 150x300' in size, which would give an area of 4 acres, said to carr vein having ore averaging 15% copper and 7 oz. silver per ton, open 100' shaft and 150' drift. Has a 20-h. p. steam hoist and a 25x64' mill

COMPAÑIA MINERA DE VIÑA DEL MAR.

Office: Santiago de Chile. Mine office: Freirina, Atacama, Chile. ized Feb. 8, 1905, under laws of Chile, with capitalization 60,000 peso 200 pesos par.

VINCENNES-ARIZONA COPPER CO. AR

Dead. Formerly at Kelvin, Pinal Co., Ariz. Described Vol. VII.

VINDICATOR COPPER MINING CO. CALIF

Letter returned unclaimed from former mine office, Greenwater, I Cal. Lands, east of Greenwater, were slightly explored, circa 1907. presumably moribund.

VINDICATOR GOLD & COPPER MINING CO.

Dead. Formerly at Uinta, Weber Co., Utah. Described Vol. VI

VINSON CREEK GOLD & COPPER CO. O

Letter returned unclaimed from former mine office, Austin, Grant Burton Miller, president and general manager. Organized circa Janua with capitalization $1,000,000, Lands, 4 claims, 5 miles from Austin, sh strong vein, traceable about 2,000', having a 25' shaft showing ore 13.16 to 25.3% copper, with small gold values, and a tunnel planned the vein at a depth of 400'.

LD & COPPER MINING CO. **WASHINGTON.**
care of E. M. Kinnear, president, Spokane, Wash. Mine office: kanogan Co., Wash. A. J. Squires, vice-president; T. W. Brown, nd general manager; Arthur W. Lindsay, treasurer; preceding officers Coleman, directors. Lands, 7 claims, area 140 acres, in the Galena the southern slope of Æneas Mountain, 17 miles south of Loomis, quartz-porphyry dike, carrying ores giving good assay values in d, silver and gold. Presumably idle.

A MINING CO. **VIRGINIA.**
office: Virgilina, Halifax Co., Va. Has gold and copper ores, with mill.

-ARIZONA COPPER CO. **ARIZONA.**
Richmond, Va. Letter returned unclaimed from former mine office, Co., Ariz. Jas. W. Graves, president; Julius A. Hobson, vice-presi- s. Armstrong, secretary and treasurer. Organized March 13, 1907, of Arizona, with capitalization $2,000,000, shares $1 par. Idle and moribund.

A BELLE GOLD & COPPER MINING CO. **ARIZONA.**
Lost lands, 1906, to Arizona Belle Mining Co. Formerly at Vail, Ariz. Described Vol. V.

A BELLE MILLING & DEVELOPMENT CO. **MONTANA.**
Seattle, Wash. Mine office: Cooke, Park Co., Mont. Organized ary, 1908, to take over an old mine, formerly producing silver but owing copper.

A C. MINING, MILLING & SMELTING CO. **MEXICO.**
16 North Eighth St., St. Louis, Mo. Mine office: Concheño, Rayón, , Mex. Col. Philemon Chew, president; Thos. B. Raines, vice-presi- manager; preceding officers, W. W. Candy, R. H. Stevens and W. A. directors. Organized under laws of Arizona with capitalization , shares $1 par. Lands, circa 75 miles from a railroad, include the nine, opened by 4 tunnels, the Santiago tunnel showing auriferous tiferous copper sulphides assaying 22.12% to 42.73% copper, 7.6 to er and up to 40 cents gold per ton. Has steam power and plans a plant.

A CONSOLIDATED COPPER CO. **MARYLAND & VIRGINIA.**
618 Walnut St., McKeesport, Pa. Mine offices: Libertytown, Co., Md., and Stony Man, Page Co., Va. W. Harry Hamilton, presi- H. Lohman, vice-president; T. A. Robertson, secretary; George B. treasurer; Thos. A. Dunshee, general manager; C. C. Cramer, mill ndent. Organized Oct. 15, 1901, under laws of New Jersey with cap- n $1,000,000, shares $1 par; issued, $515,000.

s formerly were 1,070 acres, in 2 tracts, in Maryland and Virginia, been reduced to 64 acres of mineral lands, 3 acres of timber lands cre millsite.

Virginia tract, formerly 220 acres, freehold, on Hoak Mountain, has uced to 12 acres, and apparently there is a $2,250 trust deed out- for that tract. The Virginia property formerly was said to show l veins, traversing trap and quartzite, one of which, opened by a 320' th 950' of workings, was said to be of 12' average width, and to give ssays of circa 6% copper, 4 oz. silver and $1.80 gold per ton, mainly bonate ores, with occasional occurrences of native copper. Equipment a gasoline hoist and 3-drill air-compressor.

Liberty mine, in Frederick county, Maryland, area formerly 850 acres, under a 20-year bond and lease, but holdings have b ed to of mineral land, 3 acres of timber land and a 6-ac The

a 16x28' machine-shop, 20x28' carpenter-shop, 2 small
5 dwellings. The old 60-ton wooden concentrator, 20
centrifugal crushers, 3 Wilfley tables and a sizer. Ma
was bought of the Wellman-Seaver-Morgan Co., but th
Copper Co. being unable to pay for it, machinery w
apparently moribund.

VIRGINIA COPPER CO., LTD.

Office: 136 Liberty St., New York, N. Y. Mine
fax Co., Va. Hon. Commodore P. Vedder, president;
dent; Jas. B. Van Woert, secretary; Richard Lamb,
Davies, superintendent. Organized Aug. 31, 1900, unde
with capitalization £300,000, shares £1 par. Lands, 1,
High Hill mine, in the Virgilina district, developed by
depth, with about one mile of workings. Property show
up to 5.9% copper, 2 oz. silver and 80 cents gold per t
ores. Has a 350-h. p. steam plant and concentrator. I

VIRGINIA COPPER MINING & SMELTING CO.

Dead. Formerly at Casa Grande, Pinal Co., Ariz.

VIRGINIA MINING CO.

Office: 56 Vine St., Salt Lake City, Utah. Min
Co., Idaho. Employs 5 men. M. B. Sowles, preside
president; W. A. Byers, secretary, treasurer and gene
officers, J. B. Wardner and John Clark, directors. Org
of Arizona, with capitalization $1,000,000, shares $1 par
Lands, 12 claims, 8 partly patented, area 240 ac
district, showing slate, granite and porphyry, carrying
average 2' in width and to be traceable 6,000', showing
assaying up to 7% copper, 2% lead, 2 oz. silver and $25
is reported to have 3,000' of workings, with 7,000 tons
ment includes a 3-stamp mill. Company plans continu

VIRTUE COPPER CO.

Mine office: Baker City, Baker Co., Ore. E. S. F
Thompson, vice-president; Grant Carroll, treasurer; A.
preceding officers and Albert Backus, directors. Th

ppyrite below a depth of 230 meters. Vein dips at 45°. Produc-
en greatly hampered by poor transportation facilities, but owners
bout 40 kilometers of good wagon road to Caldera, and, 1906, built
ter railroad to Caldera, at cost of 300,000 pesos, greatly reducing
sts. Employs circa 125 men, at daily wages of 2.5 to 2.75 pesos.
1903, was circa 4,200 metric tons of ore averaging 11.8% copper,
o an output of 992,599 lbs. fine copper.

RE CONSOLIDATED MINING & SMELTING CO. **COLORADO.**

Chicago, Ills. Mine office: Turret, Chaffee Co., Colo. Lands, 5
ed by a 615′ shaft, showing concentrating ore. Has a steam plant,
mpressor and 50-ton mill, equipped with a crusher, Elspass mill and
g tables. Mine said to be under lease, expiring 1911, to a Lead-
ate.

SONS. **WALES.**

and works: Swansea, Glamorganshire, Wales. The Hafod works,
, dating from 1810, include smelters for treatment of gold, silver
ores, and a small electrolytic furnace. Firm also owns the Margam
Port Talbot, near Swansea, latter having rolling mills making
ss and yellow metal sheets, tubes and other finished products.

A MINERA VLADIVOSTOCK DE COLLAHUASI. **CHILE.**

Iquique, Chile Mine office: Collahuasi, Tarapacá, Chile. Organ-
31, 1906, under laws of Chile, with capitalization 640,000 pesos,
esos par.

C COPPER MINING & SMELTING CO. **CALIFORNIA.**

Formerly had an office at 356 South Broadway, Los Angeles, Cal.

C MINE. **BRITISH COLUMBIA.**

office: Grand Forks, Boundary district, B. C. R. A. Brown, owner.
acres, on the north fork of the Kettle river, showing a great hill
rous pyrrhotite. Vein, claimed to be 600′ wide, shows small values
and gold near surface, with promise of better values at depth. Has
nnel, which has not yet reached the ore body. Property, though low
is considered promising, because of vast size of its ore body.

C MINING, SMELTING & **BRITISH COLUMBIA.**
LOPMENT CO.

Formerly at Grand Forks, Boundary district, B. C. Described Vol. IV.

NET COPPER, LTD. **CHILE.**

Liquidated, October, 1905. Formerly at Antofagasta, Chile.

MINING CO. **IDAHO.**

r returned unclaimed from former office and mine, Osburn, Shoshone
. Ira Griggs, president; John Pritchard, secretary; Stanley P. Fair-
treasurer; Frank DeLong, superintendent. Lands, on Rosebud Gulch,
iles from Osburn, have a 75′ tunnel, showing a vein of about 25′
d a lower tunnel of 360′ length. Idle and presumably moribund.

CONSOLIDATED COPPER CO. **NEVADA.**

Was succeeded by Nevada Vulcan Mining Co. Formerly at Soda-
eralda Co., Nev. Described Vol. IV.

COPPER CO. **OREGON.**

r returned unclaimed from former office, San Francisco, Cal. Mine
akilma, Josephine Co., Ore. Company bought the property of the
View Copper Co., for $24,000. Mine is said to show a promising vein
te. Equipment includes a 30-ton Vulcan smelter, never blown in.
presumably moribund.

N COPPER MINING CO. **CALIFORNIA.**

e and mine: Dunsmuir, Siskiyou Co., Cal. Employs 15 men. John R.
esident *and general manager;* Alvin J. Knight, secretary and treas-

ent. Organized under laws of Utah, and reorganized February, capitalization $2,000,000, shares $5 par; issued, $750,000. Has erous assessments.

320 acres, 140 acres freehold and 160 acres held under bond and an 800′ main shaft, with about 3 miles of workings, showing 6 ding a big new vein, cut on the 600′ level, ores carrying mainly lead values, with a little copper and gold. Is said to have expended 000 on development. Employs 30 men. Property considered prom-

A COPPER CO. **NEVADA.**

ffice: Wabuska, Lyon Co., Nev. J. E. McDermott, manager. Lands, rom Yerington, have 2 shallow shafts, deepest 120′, showing a 20′ in between limestone and porphyry, carrying sulphide ore of 1 to r tenor. Has several mine buildings.

A COPPER MINES CO. **NEVADA.**

office: Wabuska, Lyon Co., Nev. Was developing with a small ast accounts.

AZURITE COPPER CO. **NEVADA.**

and mine: Tonopah, Nye Co., Nev. Employs 10 men. Frank resident and general manager; S. K. Bradford, vice-president; Ray- n, secretary and treasurer; J. T. Spatt, superintendent. Organized 907, under laws of Nevada, with capitalization $2,000,000, shares $1 ual meeting, first Tuesday in November.

, 16 claims, unpatented, area 320 acres, in the Wagner district, with ads within one mile, showing limestone, porphyry and rhyolite, said good surface showing, opened by a 215′ shaft. Equipment includes hoist and a 2-drill air-compressor.

-GREEN MINING & MILLING CO. **COLORADO.**

Formerly at Pearl, Larimer Co., Colo.

A COPPER MINING CO. **MICHIGAN.**

Was fraudulent. Name changed to Erie Consolidated Mining & Co. Formerly at Matchwood, Ontonagon Co., Mich. Fully described

CH MINING CO. **UTAH.**

: 2206 Lincoln Ave., Ogden, Utah. Mine office: Brigham City, r Co., Utah. H. C. Baker, president and general manager; J. W. ice-president; H. R. Wadleigh, secretary. Organized April, 1904, vs of Arizona, with capitalization $1,500,000, shares $5 par, stock g divided into 5% cumulative preferred and common shares.

s, 505 acres, patented, on the western slope of the Wahsatch Moun- niles from Brigham City. Mine, as opened, carries mainly lead and lues, but the company has copper deposits in a prospective stage. t includes a 150-ton concentrator, connected with the mine by a ial tram. Water is piped to the mine and mill under a considerable imated to be capable of generating 180 h. p. Presumably idle.

T COPPER MINING CO. **WYOMING.**

e and mine: Walcott, Carbon Co., Wyo. W. C. Sammons, C. A. W. W. Petty, O. O. Shields, F. A. Raynor, A. C. Wagner and J. R. rectors. Organized circa January, 1907, with capitalization $1,000,000.

SMELTING & REFINING CO. **OREGON.**

e: P. O. Box 1487, Colorado Springs, Colo. Mine office: Takilma, e Co., Ore. Chas. L. Tutt, president; K. R. Babbitt, vice-president; Penrose, secretary and treasurer; J. A. Hull, assistant secretary and r; preceding officers, J. A. Hayes, J. O'B. Gunn and Col. T. Waln- Draper, directors; E. W. Walter, general manager. Organized Dec.

3, 1901, under laws of Colorado, with capitalization $3,000,000, shares $1 Is under same management as Takilma Smelting Co., and owns a share i therein.

Lands, 20 patented claims, area 400 acres, with millsite, also 650 a placer lands, near the Queen of Bronze mine, showing 5 fissure veins, 6 10′ average width, carrying sulphide ores of 12% copper and $3 gold a values. Has a shaft and 3 tunnels. The Copper King shaft, about 20 has an 80′ crosscut-drift, showing a good ore body. The 700′ Lyttle and the 400′ No. 2 tunnel, on the same claim, show good ore bodies. T Cowboy tunnel connects with the incline shaft, 160′ below surface, and extended to intersect known ore bodies. Property is about 40 miles fr Southern Pacific railroad. Officers of the company are men of standin long and successful mining experience, and the property is considered ising.

GEWERKSCHAFT WALDSTOLLN. GER

Dead. Formerly at Dermbach, Weimar, Germany. Described Vol.

WALES COPPER MINING CO. AL

Dead. Merged, 1904, in Hadley Consolidated Copper Co. Form Hadley, Prince of Wales Island, Alaska. Described Vol. IV.

WALKER LAKE COPPER-GOLD CO. NE

Office: 305 Clay Peters Bldg., Reno, Nev. Mine office: Dutch Esmeralda Co., Nev. E. R. Dodge, president; E. C. Harris, vice-pre G. H. Cramer, secretary and treasurer; preceding officers, R. H. Le Michael Knopf, directors. Lands, 34 claims, area 680 acres, in 8 groups timbered and watered, in the Walker Lake and Mount Grant districts, an 85′ shaft showing auriferous and argentiferous copper ore.

WALKER LAKE COPPER MINING & SMELTING CO. NE

Office: 404 Empire Bldg., Denver, Colo. Mine office: Hawthor meralda Co., Nev. Organized early 1907, under laws of Arizona, with ization $1,000,000. Lands, 4½ miles east of Walker Lake, are clai show a 2′ vein of ore assaying 9.2% copper at depth of 9′. Is not r favorably.

WALKER LAKE EXPLORATION & DEVELOPMENT CO. NE

Mine office: Hawthorne, Esmeralda Co., Nev. Frank House, manager; Andrew Bain, superintendent. Lands, on Cat Creek, 8 mil Hawthorne, show a vein of 9′ estimated average width, carrying native

WALKER LAKE INDIAN RESERVATION MINING CO. NE

Office: care of Wm. H. Wilson Co., fiscal agents, Goldfield, Nev. office: Dutch Creek, Esmeralda Co., Nev. G. R. Potter, president; J. I say, treasurer; Francis D. Adams, secretary. Capitalization $1,000,000. 3 lode claims, area 60 acres, and 160 acres of placer claims, west of Lake, said to show a dike carrying ore assaying 10 to 20% copper, wit gold and silver values. Apparently no development undertaken.

WALLACE & MISSOULA MINING CO., LTD. MON

Office: Wallace, Idaho. Letter returned unclaimed from forme office, Nine Mile, Missoula Co., Mont. P. M. Riley, president; J. H. vice-president; Edw. Blackman, treasurer; preceding officers, Jos. Thom Jas. A. Wayne, directors. Organized 1907, under laws of Idaho, with ization $1,000,000, shares $1 par.

WALLAPAI COPPER CO. ARI

Mine office: Wickenburg, Maricopa Co., Ariz. J. C. Dobbins, s tendent. Lands, 160 acres, patented, in the Bradshaw Mountains, ha 260′ shaft. Formerly employed up to 50 men. Presumably idle.

O CENTRAL COPPER MINING SOUTH AUSTRALIA.
CATE.
ffice: Kadina, Daly Co., South Australia. Property is the Bingo
g a shaft of circa 100′ depth. Diamond drilling has shown copper

O EXTENDED COPPER SOUTH AUSTRALIA.
G CO., LTD.
ffice: Wallaroo, Daly Co., South Australia. Lands, 196 acres, 3
of Kadina, adjoining the western boundary of the Wallaroo
perty has numerous pits and trenches, from early-day prospecting,
shaft, 96′ deep, shows, at 75′ depth, a 4′ vein, supposedly an exten
Wallaroo, carrying disseminated bornite and chalcopyrite.

O & MOONTA MINING & SMELTING CO., LTD. AUSTRALIA.
Steamship Bldgs., Currie St., Adelaide, South Australia. Mine
allaroo, Daly Co., South Australia, and Moonta, Daly Co., South
Works office: Port Wallaroo, Daly Co., South Australia. Employed
Jan. 1, 1907, and 1,573 men June 30, 1908, of whom 738 were at
494 at Moonta and 341 at Port Wallaroo. Jas. Harvey, chairman;
officer, Sir J. Lancelot Stirling, Sir R. C. Baker, Simpson Newland
J. J. Duncan, directors; David Davidson, secretary; H. Lipson
eneral manager; Jas. Pryor, assistant general manager; Union Bank
ia, Ltd., bankers; Elder, Smith & Co., Ltd., London agents.
ized 1899, under laws of South Australia, as a merger of the Moonta
roo companies, with capitalization £400,000, shares £2 par; issued,
To end of 1907 paid 30 dividends, aggregating £444,000, dividends
000 in 1906 and £140,000 in 1907. The Wallaroo company, previous
ger, produced copper to the value of £2,229,096, paying dividends of
therefrom, and the Moonta company, before the merger, produced
the value of £5,396,146, paying dividends of £1,168,000 therefrom,
property a total dividend record, to Dec. 31, 1907, of £2,042,254.
its, 1907, were £49,835 6s. 4d., company ending the year with balance
of £112,081 5s. 4d. Liberal allowances are made yearly for depreciа-
nting, 1906, to £15,142 17s. 7d., with total allowance for depreciation,
that year, of £142,873 18s. 9d.
s are extensive, including the Wallaroo and Moonta groups, about
apart, with various smaller properties, and site of the reduction
Port Wallaroo, all in the Yorke Peninsula, on Spencer Gulf. The
mine was discovered 1860, and the Moonta 1861, and both mines
n operated, practically continuously, since 1863.
mines use waste rock for filling, and, 1907, sent underground 40,000
of attle, for filling depleted stopes. The properties suffer from air-
milar to those of the Lake Superior copper mines, though only slight
cks are experienced. Cornish pumps have been replaced by Bellis
m electric pumps. During 1907 the mines made 5,675′ of new open-
the management very wisely took advantage of two years of high
r copper to make extensive underground development, and to add
o surface equipment. The mines having been opened nearly half a
ago, when mining practice was crude, there are entirely too many
or economical ore extraction, and the policy of the present manage-
been, and continues to be, for a reduction of the number of working
nd greatly increased hoisting capacity for such shafts as are retained
ission.
Wallaroo group, 6 miles east of Port Wallaroo, includes the Kurilla,
ining property, the entire tract having an area of circa 2,000 acres.
perty *shows schists and slates*, mainly metamorphosed mica-schist,

being found in good shape, and the mine produced some fluxing ore, losed down, April, 1908, and allowed to fill again.
lorth Yelta mine is opened by a main shaft, deepened 120′ in 1907, was stopped, November, 1907, and the mine allowed to fill.
ment formerly included a great number of small, isolated machinery more or less antiquated in design, and uneconomical in operation. years the efforts of the management have been bent toward the ion of separate plants, wherever possible, and their replacement by l more modern installations. The new central power plant at the enlarged 1907, has effected a very great saving in operating costs. ible was had, 1907-1908, owing to the poor supply of Beetaloo water. ings include a large number of shops and engine-houses, with large nodious changing-houses, the principal shafts having shower-baths rs.
portation is furnished by the government railway, which connects Wallaroo and Moonta mines with the reduction plant at Port

are concentrators at both groups of mines, and the process followed essentially the same, the exceptional weight and flaky nature of the ndering concentration exceedingly difficult, but the various metal- roblems have been met and conquered by persistence and technical the shafts ore is dumped on grizzlies, passing to bins for various nce drawn off to railway trucks, and carried to the concentrators. ills, after wet crushing, material goes to revolving trommels, from ersize goes to a traveling belt, whence ore is picked by boys, and rough crushers, with water. Ores passing a ⅝″ mesh are treated lly designed Hancock jigs, and raggings passing ⅞″ and 1¼″ meshes ed separately, on other specially designed Hancock jigs, while ma- igher than 1¼″ is hand-picked from the traveling belt. The well- ancock jig, now in use throughout the world, was designed by H. R. the former general manager, for the use of these mines. The largest he Wallaroo and Moonta mines treat 25 tons of material hourly. to 15% of the material handled is slimed, slimes going to spitzkasten, ification and distribution to round tables and vanners, which turn oduct of circa 12% copper tenor.
Devon mill, at the Wallaroo mine, was enlarged, 1907, by the addi- Ball mills and 6 Card tables, and, 1908, was given one new trans- cable and 2 additional 100-h. p. motors, with a belt-conveyor for tailings from the Wilfley and Card tables.
se material and tailings from the wash are piled in heaps, weathered ed. Heaps range 20′ to 60′ in height, the tops of the piles of coarser being laid out in terraces. Ore-heaps are systematically sprinkled, h-liquor, carrying 60 to 120 grains of copper per gallon, runs to vats. h-heaps cover about 30 acres, and contain upwards of 1,000,000 tons gs, a considerable length of time being required for complete oxidation ough leaching.
wastes and slimes go to a specially designed leaching plant, and are hrough a series of vats containing leach-liquor, 12 to 20 lbs. of acid being added to the leach-liquor for each ton of slimes treated. es in the vats are agitated by revolving arms, the pulp, after agita- ssing to settling dams and clarifying reservoirs. The leach-liquor is ff, in earthen pipes, to the main precipitating works, where it joins or from the various tailings heaps, and copper is precipitated there- scrap-iron. The material from the settling dams is weathered and second, and *occasionally a third*, leaching. The average production

of precipitate from these plants is 15 to 2
precipitate, the leaching plant makes cons

The smelter, at Port Wallaroo, does
tion to treating the company's ores, prod
mattes, amounting to 1,722 long tons, 17
works have one large and one small blast
rebuilt, 1907, and there are 4 refining furn
pots for sintering flue-dust from the bla
ore, and sintered flue-dust is turned mai
works is a blister copper of exceptional
metal having a deservedly high standing
is sold through Aron Hirsch & Sohn, und
Slags are granulated and sent back to the
property apparently being the first ever t
plant at the smelter has 2 Samuelson's blo
with Babcock & Wilcox boilers and a larg
works the company has a private railw
added, 1907.

In connection with the smelter are
latter rebuilt, 1907. The acid plant, of a
fumes from the smelter, furnishing sulph
at the mines, and, in addition sells consid
of acid, 1907, was 5,378 long tons, made

Labor conditions at the mines and w
among the best to be found in Austral
decidedly strained between employer and
implicitly with its men, and is awarded b
workmen. Underground work is done n
sliding scale of wages, by which bonuses
advances, and are cut off in the same m
company sells houses to its men, on time,
tains a library and reading-room, well s
The company also has helped to improve l
and maintenance of parks, fostering of mu
of other ways, all of which are commendab
by those benefited.

To Dec. 31, 1904, the present compan
of £4,281,342, and total value of product
£12,245,554. Recent production has been a
in 1905; 16,936,640 lbs. fine copper, 327 lon
2,326 oz. gold, in 1906; 19,314,480 lbs. fi
5,845 oz. silver and 2,009 oz. gold, in 1907
was 2,558 long tons copper, and for year
fine copper. In 1907 the mines yielded 2
aging 3.59% in copper tenor, of which th
tons, and the Moonta 77,697 tons. Of th
called waste, 72,531 tons smelting ore, n
Wallaroo mines yielded 55,129 long tons
returning 4,419 long tons finished copper,
yielded 25 long tons finished copper, and
long tons dressed ore averaging 10.66%
tons fine copper, and 835 long tons precipi
copper. Material smelted, 1907, was 75,666
regulus, with a recovery of 82.59% of val

Cost per long ton of finished coppe

15.7 cents per pound, but costs were abnormally high in that year, improvements. Like all other copper mines, costs are increasing, ply, due primarily to increased wages, and partially to increased cost al. The shareholders voted increased remuneration to the directors, 907, but, at the end of that year, the directors voluntarily reduced pensation to the former figures, on account of greatly decreased earn to the metal market, thereby setting a valuable example, and proving s gentlemen of exceptional probity. The mines are good, the manage highly progressive, and the directors are to be commended for th ly full and informing reports that they furnish to their shareholder

TREET COPPER & GOLD MINING CO. **MONTANA.**

office: Boulder, Jefferson Co., Mont. Property shows ore assaying per and 7 oz. gold per ton.

AM MINE, LTD. **COLORADO.**

e: 155 Fenchurch St., London, E. C., Eng. Mine office: Russell ilpin Co., Colo. Dr. J. H. Gower, managing director; W. F. Coote, . Organized June 16, 1903, with capitalization, £25,000, shares £1 par. clude the Waltham mine, carrying gold, silver and copper ores. Idle rs and presumably moribund.

LTA COPPER MINES, LTD. **AUSTRALIA.**

e: 30 Moorgate St., London, E. C., Eng. Mine office: Kadina, , South Australia. A. S. Caine, chairman; J. A. Russell, secretary. 40 acres, including the Wandilta mine, having a 2′ to 3′ vein, opened ′ shaft, with limited development. Idle some years and moribund.

MINING CO. **COLORADO.**

e: 932 Equitable Bldg., Denver, Colo. Letter returned unclaimed mer mine office, Wapiti, Summit Co., Colo. Ores carry gold, silver, copper. Has a small concentrator. Idle and apparently moribund.

AH MINE. **AUSTRALIA.**

e office: Grafton, N. S. W., Australia. Mine, at Fine Flower, near has, at 30′ depth, a vein of 4′ 6″ width carrying azurite and e.

AH SMELTER. **AUSTRALIA.**

ed by English & Australian Copper Co., Ltd.

AGLE CONSOLIDATED MINING & VELOPMENT CO., LTD. **BRITISH COLUMBIA.**

ce: 49 Wellington St. East, Toronto, Ont. Mine office: Rossland, istrict, B. C. Geo. Gooderham, president; T. G. Blackstock, vice- t; preceding officers, W. G. Gooderham, A. E. Gooderham, Geo. T. ck, W. H. Beatty, Chas. R. Hanswer and James Cronin, directors; irby, general manager; Carl R. Davis, superintendent; Chas. B. Jenkins, d purchasing agent. Organized January, 1897, under laws of British a, with capitalization $2,000,000, shares $1 par; issued, $1,750,000. vidends of $544,250, June, 1898, to February, 1900, with no dividend Is controlled, through stock ownership, by Consolidated Mining & g Co. of Canada, Ltd.

nds include the War Eagle, Richmond, Crown Point and other claims, g auriferous and argentiferous copper ores.

ke all other mines of the Rossland district, ore of the War Eagle is ower in grade at depth. Is operated in connection with the Centre ines being connected on several lines. Shipments, during 1905, were tons, of $890,269.21 gross value, giving an average of $11.34 per ton, hich the company received, after deducting freight, smelting, refining arketing charges, an average of $5.22 per ton. Production, 1907, esti- at *1,350,000 lbs. fine copper*.

e rights, and secondarily for the chances of making a mine on three umet & Cochise claims.

R COPPER CO. **ARIZONA**

: 316 Crozer Bldg., Philadelphia, Pa. Mine office: Black Warrior, Ariz. E. M. White, superintendent; J. A. Gamble, chief clerk. Ch larch 10, 1906, under laws of Delaware, with capitalization $1,000,000, 0 par, in $750,000 cumulative 7% preferred stock, and $s0,000 tock, as successor of Black Warrior Copper Co., Amalgamated, which rief financially.

s, circa 1,500 acres, in 3 groups, known as the Gold Gulch, Diamond ntgomery, latter including the Montana and Dadeville mines, adjoin s, opened by tunnels of circa 1,000' and 1,200', with about 3,000' of ..., the lower tunnel showing a vein of circa 10' estimated average rying ore estimated at 10% average copper tenor, which estimate is l excessive, ore being siliceous, and apparently averaging up to 6%. The mine has a steam plant, burning petroleum

ction plant includes a [illegible] concentrator [illegible] ton leaching plant on matting furnace. The leaching plant, [illegible] building, has 1 tanks, each 20x25x5', heated by steam coils to facilitate lixiviation. ore is delivered to the tanks from a [illegible] running above, to be replaced by a belt conveyor.

uction. [illegible] was [illegible] ent was poor, but apparently [illegible]

DE MINING CO. *COLORADO*

e: 622 Main St., Pueblo. Mine office: [illegible] . Dr. L. D. Furman, [illegible] treasurer. Organized [illegible] ation $1,500,000 [illegible] area [illegible] of 2 m. [illegible] units the [illegible] of fairly well [illegible]

O GOLD & COPPER CO. [illegible]

e: Shriner N. & W. [illegible] ...terella. Organized [illegible] on $1,000 shares [illegible] acres. Mines [illegible] a little gold. [illegible] rrying ore assaying [illegible] smelter.

CH CONSOLIDATED MINING CO. [illegible]

ol. Formerly [illegible]

CH COPPER CO. [illegible]

ce: First [illegible] from former [illegible] y. president [illegible] r; prospecting [illegible] Parry, [illegible] zation [illegible] north of Bingham [illegible] g [illegible]

TCH COPPER MINING CO.

fice: care of [illegible] nder laws of Arizona [illegible]

circa 200 acres, somewhere in the Pinto
claimed to show a 150' vein, traceable for
35' shaft, carrying ore assaying up to 40%

WASATCH KING MINING CO.

Office: Troy, N. Y. Mine office: M
Leggett, president; Geo. E. DeFreest, secr
of Utah, with capitalization $300,000, sha
120 acres, including the Wasatch King min
west of Milford, opened by a 560' tunnel.

WASATCH MINING & MILLING CO.

Dead. Merged, Sept. 1, 1908, in Uta
Milford, Beaver Co., Utah.

WASHINGTON-ARIZONA MINING CO.

Mine office: Poland, Yavapai Co., A
Lands include the Express mine, in the
those notorious mining fakers, Douglas, La
cutting a vein of auriferous copper ore
circa 200 tons of ore. Presumably idle.

WASHINGTON CO-OPERATIVE MINING

Mine office: Fairfax, Pierce Co., W
trail from Fairfax, said to show a 25' vein
inated chalcopyrite, assaying 5 to 33% co
per ton. Has an available water-power,
company's coal lands, near Fairfax, were
Coke Co. Idle for several years and appa

WASHINGTON COPPER & MILLING CO

Dead. Was a rank fraud, promoted
who are still permitted, by the federal po
"mining" shares to the credulous public.
to be "the richest copper property in the
tering prospects than the Calumet & Hecl
consisted of 50' shaft, bottomed in grav
Co., Wash.

WASHINGTON COPPER MINING CO.

Office: 42 Broadway, New York, N. Y
naw Copper Co., Hancock, Houghton Co., M
Keweenaw Co., Mich. Chas. A. Wright,
president; Chas. A. Wright, Jr., secretary
Capt. Thos. Hoatson, directors. Organized
italization $2,500,000, shares $25 par; issue
stock ownership, by Keweenaw Copper Co
in March.

Lands, 1,050 acres, on the western shor
tory work has been done, at intervals, in
plans for resumption in near future.

WASHINGTON-IOWA COPPER MINING

Mine office: Index, Snohomish Co., W
of Silver Creek, 2 miles above Mineral C
Development Co., and both properties are
velopment being through the 880' Bonanza
and is expected to cut 5 additional ore
vertically.

WASHINGTON SMELTING & REFININ

Works office: Keller, Ferry Co., Wash
tion $1,000,000, shares $5 par, to build a

15 miles south of Republic, to treat the ores of the Belcher Mining
ljoining properties. No trace of operations.

GTON-SONORA GOLD & COPPER CO. **MEXICO.**

: care of A. Sandoval, treasurer, Nogales, Sonora, Mex. Mine office:
, Sonora, Mex. A. L. Lewis, president; Percy Sharpe, secretary
al manager. Organized 1902, under laws of Arizona, with capitaliza-
0,000, shares $5 par. Lands, 4 pertenencias, area 10 acres, showing
ns and lenses in limestone, carrying a little native copper, and oxide
nate ores, having estimated values of 18% copper, 12 oz. silver and
r ton, slightly developed by shafts and tunnels. Idle several years.

GTON TUNNEL & COPPER CO. **WASHINGTON.**

Former office was at Bridgeport, Conn. Lands were 36 claims, on
Hill. Company planned, 1907, an 8,000' double-track tunnel to test
operty and cut 8 known ledges. Formerly at Conconully, Okanogan
.

COPPER CO. **MONTANA.**

: 42 Broadway, New York, N. Y. Mine office: Butte, Silver Bow
. Employs circa 300 men. John D. Ryan, managing director; Wm.
superintendent. Capitalization $20,000,000, shares $10 par. Is con-
arough ownership of entire stock issue, by Amalgamated Copper Co.
holds title to the Washoe Reduction Works, which are leased to the
Copper Mining Co., and the Washoe Copper Co., at last accounts,
530,000 to the Amalgamated Copper Co., this being the amount bor-
construct the Washoe works.

ls, 37 acres, including the Moonlight, Clear Grit, Cambers and Poulin
hich were operating, 1907, also the Washoe, Pacific, Oden and Gold
ns, mainly fractional. Company had some litigation, 1907, with East
xtension Copper Mining Co., claiming latter had trespassed on ore
f the Washoe. Miscellaneous lands include 1,900 acres of coal lands
Creek, in the vicinity of Red Lodge, Carbon Co., Mont. The com-
o holds a controlling interest in the Cokedale Coal Co., owning coal
d 100 coke-ovens.

Moonlight mine, which is the principal producer, has ore averaging
oz. silver for each unit of copper. The Moonlight has a 1,500' three-
nent shaft, connected underground with the Blue Jay, Neversweat,
la and Pacific mines, and is timbered with 10x10" square and round
in square sets. Equipment includes a 20x48" Dickson hoist, raising
e-deck cages with a 6" flat cable, and 2 Ingersoll Sergeant air-com-
, of 50 drills aggregate capacity.

Cambers mine has a 225' two-compartment shaft, connected with the
and Henry George mines, equipped with a 10x14" hoist raising single-
ges with 1" round cable.

Clear Grit mine has a 600' two-compartment shaft, and is opened to
f 1,000' by a 400' winze, being connected underground with the West
and Mountain Consolidated mines. Hoisting is by bucket, develop-
aving been hampered, until 1906, by litigation with the Heinze interests.
e Poulin mine produces a limited quantity of ore averaging circa 2%
and 5 oz. silver per ton.

e mill, at Butte, known as the Taylor & Brunton sampling works, was
in 1904.

r year ending June, 1907, production was 121,608 tons of ore, averaging
eturns of $10.92 per ton, costing $4 per ton for extraction and $2.32 per
reduction, with net earnings of $266,973, and in the preceding year
itures were $175,721 in excess of receipts. For year ending June 1,
roduction was 115,620 *tons of ore*, yielding gross values of $1,052,956,

...Production, October, 1908, was said t... ...lbs. fine copper, or at the rate of ... ...ging 2.35 to 3% copper and 5 to ... ...timated at 6,000,000 lbs. fine copper for ...

...COPPER MINING CO. **WASHINGT...**

...St. Louis, Mo. Mine office: Washougal, Cl... ...president; J. D. Wilcox, vice-president; J. B. Jo... ...; Dr. Otta Sutter, treasurer; preceding offi... ...D. Wright, general manager; Orrvis Wright, ...1902, under laws of South Dakota, with capital ...

...held on a 30-year lease, from the state, near Mt. ... ...district, on the upper Washougal river. La... ...granite, carrying several fissure veins, of ... ...of estimated average width, developed by 2 ... ...and argentiferous copper, lead, zinc and silver, ...copper, 15% lead and zinc, 2 to 70 oz. silver ...

...gasoline hoists, a 3-drill Leyner air-compressor, an... ...power plant, installed 1908, having a Pelton wheel develop... ...head. The company also has a sawmill and bri... ...had an Allis-Chalmers blast-furnace on the ground, ...Company was free from debt, at last accounts, and employ... ...1908. Property considered promising, and developme...

...MINING CO. **NEW MEXI...**

...Worcester, Mass. Mine office: Orogrande, Otero Co., N. M. J... ...president and treasurer; Col. J. A. Prescott, secretary and g... ...Chas. H. Knibbs, superintendent; preceding officers, Th... ...W. Spender, Josiah K. Bennett and G. E. Moffett, directo... ...property formerly held by the Boston-Jarilla Copper Co., ...Nannie Baird mine, opened by a shaft showing auriferous ... ...copper ore, with a land and lease on the War Dog group ...

...& WASHINGTON MINING & SMELTING CO. **WASHINGT...**

Dead. Lands sold, for debt, January, 1908, to Stephen H. Kennedy. ... ...at Bossburg, Stevens Co., Wash.

...COUNTY MINING & MILLING CO. **UT...**

Dead. Was organized circa October, 1906, and was succeeded Janu... ...by Del Verde Tunnel Co. Albert Scocroft was president. Formerly ... Ogden, Weber Co., Utah.

...MINING CO. **UT...**

Letter returned unclaimed from former mine office, Marysvale, Piute ... Utah. Wm. E. White, superintendent; Fisher Bros. & White, lessees. Mine ... produced some silver, lead and gold ores in the past. Present management ... developed ore assaying 5 to 40% copper.

...BERGWERKE G. m. b. H. **GERMA...**

Mine office: Markirch, Elsass, Germany. Dr. Recht, president; J... Siebenschuh, superintendent. Capitalization, 1,400,000 marks. Is a prod... of silver, copper and antimony, mainly from tetrahedrite.

...COPPER CO. **IDA...**

Office: care of John B. Weimer, manager, Salt Lake City, Utah. ... office: Dubois, Fremont Co., Idaho. Peter Weimer, superintendent. L...

were 18 claims, area 360 acres, said to have been increased, 1907, to area 880 acres. Mine has an open-cut and 3 tunnels, 2 longest 300′ perty shows a contact zone of 100′ to 200′ width, between quartzite tone, carrying high-grade ore in pockets and cross-fissures, latter, 2′ width, running at right angles to ledge. Shipped, 1907, con- ore of 16 to 18% copper tenor, production for year amounting to 000 lbs. fine copper. Planned a smelter, but company in debt and l to be unpaid for. Property considered promising, but company r in a bad way.

y CA. **PERÚ.**

office: Nuevo Cañete, Lima, Perú. Mine has auriferous and ar- is copper ores, worked on a small scale, at last accounts.

GOLD & COPPER CO. **ARIZONA.**

: Tucson, Ariz. Mine office: Weldon, Pima Co., Ariz. Jas. A. ice-president; Ferris S. Fitch, secretary, treasurer and general man- eceding officers, Hon. Samuel W. Smith, Frederick M. Alger and Osborne, directors; Luke Turnbull, superintendent; J. M. Martinez, erintendent; Clare Turnbull, mill superintendent; J. B. Tomlinson, engineer.

nized Jan. 26, 1901, under laws of Arizona, with capitalization), shares $1 par; issued, $2,175,000. Was said, August, 1907, to have upwards of $100,000. Has circa 450 shareholders. Annual meeting, day in February.

ls, 49 claims, partly patented, area 980 acres, and 3 millsites, with a of 1,020 acres, in the Quijotoa district, circa 40 miles from the & Southern railway. Lands show granite, andesite, shales and lime- ported to carry 8 contact deposits, between granite and andesite, two be traceable 2 miles, of which one, of 200′ claimed average width, ainly gold values. The copper ore body shows malachite near sur- d at depth has auriferous chalcopyrite, associated with sphalerite, nd pyrite, with a brecciated quartz gangue, giving assays of 10 to per and 5 to 70% lead. Ore values, as a whole, apparently are more silver and lead than in copper.

elopment includes an old 1,800′ crosscut tunnel, not used by present , driven, circa 1880, by the Peer & Peerless Mining Co. New develop- nsists of shafts of 330′, 200′, 150′, 100′, 112′, 85′ and 60′, and tunnels 275′, 200′, 100′, 132′, 101′, 123′, 100′, 200′ and 100′, with total work- circa 4,500′, at end 1906, estimated to show 1,000,000 tons of ore, which re excessive, with 90,000 tons blocked out for stoping.

ipment is reported by company to include a steam and gasoline installa- gregating 500 h. p. at the mine and mill. There are two 45 h. p. hoists, r 700′ depth, and Fairbanks & Morse and Leyner air-compressors of aggregate capacity.

ldings, 17 in number, include an 18x20′ wooden machine-shop, boiler- arpenter-shop, smithy, boarding-house, assay office and store.

100-ton stamp-mill and concentrator, 75x100′ in size, of wood, sheathed on, has 30 gravity stamps and a 250-h. p. engine. Equipment of the rator includes 4 Blake and Samson crushers, one 50-ton Elspass cen- crusher, and 3 Standard tables. In 1907 the company installed the x Electro Cyanide process, consisting of an agitator, filter and pre- r, and mill was said January, 1907, to be running double shifts, making tons of concentrates daily, according to the company's annual reports, [illegible] returns of the Territory of Arizona, covering the year 1907, do production of copper, silver or gold by this company.

WELLINGTON COPPER MINING CO. NEW ME

Mine office: Cutter, Sierra Co., N. M. Organized circa November under laws of New Mexico, with capitalization $3,000,000, by Edw. F. J. A. Sherman and Jas. F. Kindall.

WELSH COPPER MINING SYNDICATE, LTD. W

Office: 9 Fenchurch Ave., London, E. C., Eng. Mine office: T R. S. O., Cardiganshire, Wales. John Bell-Irving, chairman; Richard bett, managing director; W. H. Bartlett, secretary. Organized Apr. under laws of Great Britain, with capitalization £17,500, shares £1 par. 933 acres, including the Esgair Hir mine, carrying argentiferous cop lead sulphides, in 2 fissure veins of 40′ average width, claimed by to average 3 to 10% copper, 4 to 5% lead and 13 oz. silver per ton, op shafts of 150′ and 500′. Has a 40-ton concentrator. Idle some years sumably moribund.

WENDENDALE GOLD MINING CO. AI

Mine office: Wendendale, Yuma Co., Ariz. Lands, in the Cun Pass district, gave ore that yielded 13% copper and $12 gold per ton smelter shipment, 1906. Presumably idle.

WENDIGO COPPER CO., LTD. MIC

Dead. Was an offspring of, and, July, 1901, was absorbed by, Isl Land Corporation, Ltd. Formerly on Isle Royale, Michigan. Fully Vol. II.

WENTWORTH COPPER CO., LTD. NOVA

Mine office: Wentworth, Cumberland Co., N. S. Organized circa 1907, to take over lands, bought at foreclosure sale, of Cumberland C

WERDENHOFF MINING & MILLING CO.

Office: care of Hon. F. W. Hunt, president, Boise, Idaho. Mi Warren, Idaho Co., Idaho. Stephen A. Powell, secretary; Horace treasurer. Capitalization $5,000,000, shares $1 par. Lands, 9 lode cl 2 placer claims, area 240 acres, in the Big Creek district, showing zone of about 250′ width, carrying mainly gold values, with a little copper.

WESSEL COPPER MINING & MILLING CO. A

Office: St. Louis, Mo. Mine office: Casa Grande, Pinal Co., Ari 2 miles north of Toltec, have a 97′ shaft showing a 10′ vein assaying copper, and about $2 gold per ton, with occasional silver values.

WEST BINGHAM COPPER CO.

Office: 1104-43 Exchange Place, New York, N. Y. Mine office: Canyon, Salt Lake Co., Utah. Presumably idle.

WEST BRITISH DEVELOPMENT SYNDICATE, LTD. I

Office: 1 Crosshall St., London, E. C., Eng. Mine office: Bere Cork, Ireland. Harry V. Kilvert, J. P., chairman; Thos. L. Miller Wilson, managing directors; G. S. & T. Holmes, mine managers; R. secretary. Organized Aug. 16, 1905, under laws of Great Britain, talization £31,500, in 30,000 £1 6% cumulative preference shares deferred shares of 1s. par. Property is sundry leasehold lands, at Crookhaven, Borlin and Cahermore.

WEST BUTTE MINING CO. M

Letter returned unclaimed from former office and mine, Butte, S Co., Mont. Chas. Schmidt, president; W. McConnell, vice-presiden G. Dolman, secretary and treasurer. Organized Jan. 31, 1906, unde Montana, with capitalization $3,000,000, shares $5 par. Property on the Columbia and Montrose claims, in the western part of trict, the Columbia claim, area 9.32 acres, having a 144′ shaft

$100,000 worth of silver ore, many years ago. Idle and appar-

EA COPPER CO. **MEXICO.**

rned unclaimed from former office, Bisbee, Ariz. Mine office: rizpe, Sonora, Mex. John H. Slaughter, president; J. A. Howell, reasurer; preceding officers, W. T. Hughes, B. N. Norton, C. B. C. Gress, directors. Organized Sept. 5, 1906, under laws of Ari- talization $500,000, shares $1 par. Management is said to have e fresh stock to clear up a $40,000 indebtedness. Lands, 286 5 miles west of the Greene Cananea, opened by a tunnel said ped considerable ore of fair grade. Shipped, 1907, a little ore lter. Presumably idle.

URRY COPPER CO., LTD. **AUSTRALIA.**

und up August, 1907. Was organized June 28, 1906, with capi- 00, shares 10s. par. Formerly at Cloncurry, Beaconsfield Co., stralia.

MINING CO. **ALASKA.**

: Latouche, Latouche Island, Alaska.

MINING & SMELTING CO. **MEXICO.**

nnsylvania Bldg., Philadelphia, Pa. Mine office: Mocorito, Howard L. Hains, president; Robert C. Thomas, vice-president; , secretary; Henry B. Neely, treasurer; preceding officers, Jas. sham C. Colkett and Geo. B. Wilson, directors; Edward H. Hicks, r. Organized circa 1906, under laws of Maine, with capitaliza- , shares $1 par, in $500,000 preferred 7% stock and $2,000,000

groups, 5 to 20 miles from Mocorito, principal property being , area circa 400 acres, showing 6 copper veins, of which 3 under ith circa 1,500′ of tunnels, are said to give ores averaging 8 to d $10 to $12 combined gold and silver values per metric ton. vas claimed, 1907, to have in sight circa 200,000 tons of ore, of ton average value.

, installed late 1908, includes a mining plant having a 35-h. p. ll-Rand air-compressor and 6 Rand power drills. A small con- practically completed at end of 1908, and was planned to be in ater than Feb. 10, 1909. Company planned, early 1907, a 50-ton parently has installed the concentrator in preference.

IBUS COPPER CO. **UTAH.**

Broadway, New York, N. Y. Mine office: Alta, Salt Lake Co., tillman F. Kneeland, president; W. F. Adams, treasurer; Jas. retary; preceding officers, F. W. Davis, John P. Stone and D. C. ctors; Anthony O. Jacobson, manager. Organized circa 1907, Arizona, with capitalization $400,000, shares $1 par. Lands, 6 00 acres, about one-half mile from the Columbus Consolidated o carry the extension of the ores of the latter. Has a tunnel saying up to 12% copper, 90 oz. silver and $4 gold per ton.

A MINE. **MONTANA.**

Boston & Montana Consolidated Copper & Silver Mining Co.

RICA MALACHITE COPPER CO., LTD. **ANGOLA.**

rmerly at Bembe, Angola.

NSOLIDATED MINING CO. **MEXICO.**

rned unclaimed from former mine office, Hermosillo, Sonora, 00 hectares, 18 miles north of Hermosillo, said to show about worked in the past to shallow depth. Has a 150′ shaft with 2 n a 4′ silver-lead vein, and a 30′ two-compartment shaft on a

copper vein. Has two 65-h. p. boilers, a 12x14" hoist with 4' drum, a drill air-compressor, with a 1½-mile pipe-line to the Sonora River.

WESTERN COPPER CO. A

Letter returned unclaimed from former mine office, Globe, Gila C Property was said to show a 2' vein, assaying 25% copper. Idle an ently moribund.

WESTERN COPPER CO. MO

Office: Calumet State Bank Bldg., Calumet, Mich. Mine office: Butt Bow Co., Mont. Organized circa August, 1908, with capitalization $ shares $5 par, as a reconstruction of Calumet & Butte Mining Co., and c new stock for old, on a parity, new stock being marked $2 paid in. Mer Miners Bank, Calumet, transfer agent.

Lands, 14 claims, area 166 acres, in the vicinity of Columbia Gar cluding 2 claims known as the Albert and Richelieu, near the Alt which the old company spent about $100,000. Development is by deepest 530', with a crosscut started on the 500' level. Mine has abo of workings, showing native copper, azurite, and malachite. Shipped little ore, taken from shallow workings, averaging about 12% copper.

WESTERN EXPLORATION CO. A

Dead. Was succeeded by Globe Mines Exploration Co. Formerly Gila Co., Ariz.

WESTERN EXPLORATION CO. CALI

Dead. Formerly at Winthrop, Shasta Co., Cal. Described Vol. V

WESTERN MINING CO. COL

Office: 71 Broadway, New York, N. Y. Mine office: Lake City, Co., Colo. Saml. D. Nicholson, general manager; N. A. Nicholson, sup ent. Property includes the Ute and Ulay mines, carrying auriferous a tiferous lead and copper ores. Has water, steam and electric pow 200-ton concentrator.

WESTERN MINING CO. MO

Office: Butte, Mont. Mine office: Apex, Beaverhead Co., Mo Willoughby, superintendent. Was held, formerly, by Washoe Copper C a $125,000 bond and lease, dated Dec. 8, 1904, and the Amalgamate Co., or some subsidiary corporation, supposedly owns a considerable terest.

Lands, one claim, patented, area 20 acres, also a 3-acre millsit Utopia district. Property shows granite, dolomite and quartzite, wi tact deposits, between granite and limestone, of 8' to 10' average veloped by shafts of 150' and 220', and by an 820' tunnel, with 1,600' ings, estimated to show 50,000 tons of ore, with 10,000 tons blocke stoping. Ores are mainly chalcocite and chalcopyrite, with a co variety of oxidized ores, giving average returns of circa 9% coppe silver and 40 cents gold per ton. Mine, opened 1867, has been work intermittently, by leasers. The mine is said to have found no large o

Equipment includes steam and gasoline power, and a small sme nected with the shafts by a tramway. The smelter has a 30-ton 36 water-jacket blast-furnace, and, when operated, made matte avera copper, 27 oz silver and 0.13 oz. gold per ton.

Production, 1903, was circa 1,400,000 lbs. fine copper, since wh has been no regular output, though small quantities of ore have been by lessees, from time to time.

WESTERN MINING & DEVELOPMENT CO. A

Office: Chicago, Ills. Mine office: Planet, Yuma Co., Ariz. claims, known as the Copper Prince group, 12 miles northeast of P the Bill Williams Fork river, formerly owned by Signal Copper Co.,

company under bond and lease. Development is by a 150' shaft, on
y of auriferous copper ore, of medium to high grade. Water power
from the Bill Williams Fork river. Property considered promising.

MINING & DEVELOPMENT CO. **COLORADO.**

42 Home Bank Bldg., Detroit, Mich. Mine office: Pearl, Larimer
A. C. Stellwagen, president; F. W. Henninger, vice president; J. D.
ecretary and treasurer; C. E. Knapp, general manager; Harold Wil
ntendent. Property was a lease, expiring 1906, on the holdings of
opper Mining & Smelting Co. Idle and presumably moribund.

I MINING & MILLING CO. **UTAH.**

14 West First St., Salt Lake City, Utah. Mine office: Lincoln,
, Utah. J. H. Hurd, agent; John B. Taylor, superintendent. Has
l and copper ores, with steam power, employing about 30 men at
its.

N MINING & STEEL CORPORATION. **CALIFORNIA.**

Formerly at San Luis Obispo, San Luis Obispo Co., Cal.

N MONTANA MINING CO. **MONTANA.**

Former officers were A. H. Gray, president and general manager,
Butterfield, financial agent. Company, organized 1905, had an office
ark Building, Pittsburg, Pa. Lands included the Exchequer and
mines, lying north of the Richmond and Monitor, developed by a 400'
ormerly at Superior, Missoula Co., Mont.

N NEVADA COPPER CO. **NEVADA.**

: 608 Dooly Bldg., Salt Lake City, Utah. Mine office: Yerington,
Nev. Employs circa 40 men. C. F. Loose, president; Frank Kuns,
preceding officers, Samuel Newh[illegible] Hon. Reed Smoot and H. H.
ectors; John Josten, secretary; [illegible] Johnson, general manager;
Cook, assistant manager; R. H. [illegible], superintendent. Organized
ember, 1906, under laws of [illegible] organization $5,000,000,
par.

s. 8 claims, patented [illegible] ... Lyon group, com
lits and a smelter [illegible] ... Lane,
mile south of the [illegible] ...
w a contact deposit [illegible] ...
ith strong mineralization [illegible] ...
h strike, with [illegible] ...
argentite [illegible] ...
[illegible] ...
nd a [illegible] ...
0' vertically below ...
[illegible] ...
[illegible] ...
[illegible] ...
ng.

N PACIFIC MINING CO. **NEVADA.**

ce: 209-61 Exchange [illegible] ...
[illegible] ...
[illegible] ...
[illegible] ...
[illegible] ...
[illegible] ...
[illegible] ...

N QUEEN MINING CO. **NEVADA.**

e office [illegible] ...

general manager; John McKenzie, superinte
road, lying next west of the Corona Consoli
former owners, showing a vein with a 6" t
oz. silver per ton, balance being low grade
ore. Has shipped ore returning 22% lead

WESTERN SLOPE COPPER MINING & S

Office: Thompson Bldg., Butler, Pa. M
Co., Colo. J. S. Shaw, president and genera
president; A. F. Regal, secretary; W. R.
superintendent; preceding officers, P. H. Se
Clelland and C. M. Harden, directors. Orgs
Pennsylvania, with capitalization $750,000,
reorganized, circa 1908, with a complete ar

Lands, 10 claims, area 200 acres, also
in the Unaweep district, 23 miles southeas
from Whitewater, the nearest railroad poin
250' shaft, from which 17 carloads of ore, sh
of 11 to 18% copper.

The former management of this comp
ting furnace, blown in June, 1905, but there
the smelter.

The old management paid regular quar
dling stock, but the new directorate is co
the old. Property considered promising.

WESTERN THARSIS MINING CO., N. L

Dead. Formerly at Mt. Lyell, Montag

WESTERN TIN & COPPER SYNDICATE,

Dead. Was organized Nov. 21, 1906,
capitalization £50,000, shares £1 par, and
nack Tin Mine, Ltd. Formerly in Cornwal

WESTERN UTAH COPPER CO.

Office: Salt Lake City, Utah. Mine
W. S. McCornick, president; Duncan McV
secretary and treasurer; preceding officers
Henry M. Sweet and Hon. John A. Street,
1906, under laws of Wyoming, with capitali

Lands, 20 claims, area 364 acres, 100 m
Gold Hill mine, in the Clifton section of t
14 open-cuts, pits and shafts, deepest vari
showing a 12' to 15' vein, with a 3' paystre
22 oz. silver and $11 to $14 gold per ton. M
of ore blocked out, which estimate is consi
1907, owing to lack of funds. Property co

WEST FORK GOLD-COPPER MINING CO

Dead. Was a rank bit of stock-jobber
Pike, of Boston, when the United States p
watching petty swindlers and so blind to t
the continued use of the federal mails
"suckers." Formerly in Idaho county, Ida

WEST GREY ROCK MINE.

Owned by Butte & Boston Consolidated

WEST LE ROI MINING CO., LTD.

Dead. Compulsorily wound up, Novem
Trail district, B. C.

ELL EXTENDED MINING CO., N. L. **TASMANIA.**
Formerly at Gormanston, Montagu Co., Tasmania.

ELAND COPPER CO. **NEW BRUNSWICK.**
Formerly at Dorchester, Westmoreland Co., New Brunswick.

UNTAIN MINING COMPANY, OF ARIZONA. **UTAH.**
Lands lost, and money refunded to those who bought stock. For
ingham Canyon, Salt Lake Co., Utah. Described Vol. V.

UNT LYELL COPPER, GOLD & SILVER **TASMANIA.**
NG CO., TASMANIA, LTD.
Was succeeded, Oct. 7, 1897, by Copper Mines of Mount Lyell West,
dead. Formerly at Gormanston, Montagu Co., Tasmania.

UNT LYELL, LTD. **TASMANIA.**
212 Mansion House Chambers, London, E. C., Eng. Operating
bart, Tasmania. Mine office: Gormanston, Montagu Co., Tasmania.
r, chairman; R. J. Cribb, secretary. Organized Oct. 2, 1907, under
reat Britain, with capitalization £100,000, shares £1 par, as a recon-
of Copper Mines of Mount Lyell West, Ltd.
, 8 claims, area 84 acres, adjoining the Mount Lyell Mining & Rail-
Ltd., showing several wide ore bodies, giving assays of 3 to 7%
ith small gold and silver values. Development is by 2 tunnels, prin-
g the Razor Back. Company also has acquired gold mining claims
araki district of New Zealand. Copper property apparently is idle.

UINCY MINING CO. **UTAH.**
Atlas Blk., Salt Lake City, Utah. Mine office: Park City, Summit
G. D. B. Turner, president and general manager; J. R. Rand, vice-
H. C. Gaw, secretary and treasurer; preceding officers, Dr. E. V. Van
W. H. Dodge, E. E. Hendrick and W. C. Alexander, directors. Organ-
, under laws of Utah, with capitalization $1,500,000, shares $5 par.
eeting, second Tuesday after first Monday in May.
erty is a ⅜ interest, with an option on the remaining interest, in the
nine, lands, 5 claims, supposed to carry the extension of the Quincy
of the Daly-West mine. Has a 600′ two-compartment vertical shaft,
ssout tunnel through property of the Little Bell mine, cutting a con-
giving assays up to 20% lead, 160 oz. silver and $2 gold. It is ex-
at the main ore body will be cut at depth giving a back of 750′, and
Daly West contact vein will be cut at depth giving a back of 900′.
ble trouble has been had from shifting ground and a heavy inflow
Property was explored, 1907, to depth of 1,300′ by diamond drills.

LIAN COPPER MINE, LTD. **AUSTRALIA.**
Was reorganized, circa 1899, as Balla Balla Copper Mines, Ltd.,
s reorganized, Apr. 16, 1901, as New Balla Balla Copper Mines, Ltd.
at Port Balla Balla, Western Australia.

T. DAVID'S GOLD & COPPER MINES, LTD. **WALES.**
Formerly at Barmouth, Merionethshire, Wales.

DE MINING CO. **WASHINGTON.**
Formerly at Berlin, King Co., Wash. Described Vol. II.

LOPE MINING & MILLING CO. **UTAH.**
Formerly at La Sal, Grand Co., Utah. Described Vol. III.

EWART MINE. **MONTANA.**
d by Original Consolidated Mining Co.

RGINIA & MONTANA MINING CO. **MONTANA.**
office: Helena, Lewis & Clark Co., Mont. Lands, 4 claims, west
. Mine produced a little silver-lead ore in the past, but shows
of good tenor on the 200′ level.

WEST VIRGINIA-WYOMING COPPER CO. WYO

Office: Rawlins, Carbon Co., Wyo. Mine office: Rambler, Carbo Wyo. Employs 8 men. Philip Frankenberger, president; Myer New vice-president and general manager; Herbert Frankenberger, secretary; Newberger, treasurer; John W. Buckley, superintendent; W. S. Tray sistant superintendent; Geo. H. Hand, consulting engineer. Organize ruary, 1907, under laws of Wyoming, with capitalization $2,000,000, sh par; issued $1,242,000. Annual meeting, first Tuesday in February.

Lands, 7 claims, area 102 acres, one-half mile from the Doane-I mine, in the Battle Lake district, showing 2 contact deposits, betwee and quartzite, of which one, under development, of 5′ to 6′ averag traceable circa 3,000′, gives sulphide ores estimated to average 8% co oz. silver and 0.5 to 1 oz. gold per ton. Development is by a 150′ sha 250 tunnel. Litigation over title was settled, 1908, in company's favo

Equipment includes a 45-h. p. steam hoist and a 2-drill Rand air-co and there are 2 mine buildings. Company plans continuous developm

WEST YERINGTON COPPER MINING CO. N

Office: Provo, Utah. Mine office: Yerington, Lyon Co., Ne Roundy, president; O. H. Stone, vice-president; Heber Jex, secret treasurer; preceding officers, A. Craven and Jos. Wirthlin, directors. ized circa June, 1907, under laws of Utah, with capitalization $100,00 10 cents par. Lands, 12 claims, circa 7 miles southwest of Yerington. ably idle.

WHALEN CONSOLIDATED COPPER MINING & SMELTING CO. N

Dead. Was a swindle, perpetrated by Wm. Whalen. Formerly at Eureka Co., Nev.

WHAT CHEER COPPER MINING CO. WY

Office: 171 Westminster St., Providence, R. I. Letter returned w from former mine office, Riverside, Carbon Co., Wyo. Wm. C. Price, p J. Frank Baird, vice-president; J. F. Freeman, secretary and treasur Alers, manager. Organized under laws of Wyoming, with capit $600,000. Lands, 4 claims, near Aetna, on Dunkards Creek, near P Gulch, opened by a 65′ two-compartment shaft and a 237′ tunnel, stringers of copper ore. Equipment includes a steam plant and small Idle and apparently moribund.

WHEAL ELLEN MINE. SOUTH AUS

Mine office: Woodchester, South Australia. Company bought, mining plant of the Strathalbyn Mining Co., and planned resumpt July, 1908.

WHEAL FORTUNE EXTENDED, LTD. AUS

Office: 31 Eagle Wharf Road, Hoxton, London, N., Eng. Mi Northampton, Western Australia. A. Rees, secretary. Organized Feb. under laws of Great Britain, with capitalization £5,000, shares £1 pa erty is lead and copper claims. Idle some years.

WHEALKATE MINING CO. MI

Office and mine: Houghton, Houghton Co., Mich. Nathan F. president; R. R. Goodell, vice-president; Reginald C. Pryor, secretary; Leopold, treasurer. Organized November, 1902, under laws of Mich capitalization $50,000, shares $25 par. Lands, 240 acres, including Wheal Kate mine, on which a little sadly misdirected work was do years ago. Is primarily a land and townsite company, but owns mine in Section 17, carrying the southern extension of the Isle Royale cupriferous beds. Did some diamond drilling, 1907.

WHEAL TURNER COPPER MINING CO., LTD. AUS

Mine office: Yudnamutana, South Australia. Lands, known as

ie, 6 miles northwest of Yudnamutana, show 8 veins, with northeasterly
arrying cuprite, azurite, malachite, chalcocite and tetrahedrite, with
ngue and an iron gossan. Hand-dressed samples gave a bulk assay of
% copper. Development is by 4 shallow shafts, deepest 54′. In 1905
id of £1,000 from the state, and was prospecting on the proposed rail-
to the Queensland border.

ER GOLD MINES CO. **NEVADA.**

: 414 Atlas Blk., Salt Lake City, Utah. Mine office: Yerington,
Nev. Apparently is a twin of the Yerington Copper Co.

REEK MINE. **AUSTRALIA.**

d by Whim Well Copper Mines, Ltd.

ELL COPPER MINES, LTD. **AUSTRALIA.**

: 62 London Wall, London, E. C., Eng. Mine office: Whim Creek,
barra Goldfield, Western Australia. Edgar Anderson, chairman and
director; preceding officer, S. Caldwell, Sidney Fawns, J. Conchie and
erlock, directors; Henry Bacon, secretary; Herbert R. Sleeman, gen-
ager; Richard Piper, mine foreman; I. Flegeltaub, metallurgist.
July 4, 1906, under laws of Great Britain, with capitalization
shares £1 par, as a reconstruction of an old company of same name.
1, 1908, had expended circa £60,000 on development and equipment.
s, 210 acres, partly freehold, known as the Whim Creek mine, 12 miles
Balla Balla, also water rights on Balla Balla Creek, sundry town lots
ed jetty at Balla Balla, and a 30-acre smelter-site at Counguina Pool, a
r lake near Balla Balla. Mining property includes 75 acres leasehold,
iron ore and limestone for fluxing. Country rocks are shales and
tter partly chloritic but mainly hornblendic, carrying mainly irregu-
r impregnations of chalcocite in silicious kaolinized strata having an
west strike and dip of only 25°, lode being very flat and conformable
g of the enclosing slates, which have been considerably crumpled.
cuprite, malachite, azurite and chalcocite, mainly the latter. Ore
3′ to 20′ in width, with an average width of 6′, and the ore zone is
circa 3,000′.

under former ownership, was poorly developed. Property has 5
unnels, of 50′, 80′, 120′, 300′ and 300′, and a 200′ tunnel in ore, with 5
afts of 60′, 69′, 74′, 77′ and 80′. About 2,000′ of openings were made
iving estimated reserves of 30,000 tons of 11% copper ore blocked out
g, with about 40,000 tons additional in sight, and 200,000 tons infer-
ore reaching the water-level. Average samples from all working
out 15 in number, gave assays of 12.18% copper, balance of ore
from assorting being estimated to carry 8% copper. Property was
07, by diamond drill. Water is either alkaline or sulphurous, each
e to the boilers, but, with careful mixing, gives feed-water causing
osion.

oncentrator, of 50 tons daily capacity, has a Gates crusher, mill being
crushing and sorting plant. Company has built a 14-mile railway,
mine to Port Balla Balla, at a cost of circa £15,000, including two
es and necessary rolling stock.

ction, 1907, was 1,808 long tons of ore averaging 22.5% copper, equal
lbs. fine copper, and before drop in price of copper, company nearly
nses from production. Employs circa 75 men. Is considered a prop-
nsiderable promise, with a good management.

E MOUNTAIN GOLD & COPPER MINING CO. **CALIFORNIA.**

: 803-405 South Hill St., Los Angeles, Cal. Mine office: Needles,
rdino Co., Cal. Jas. L. Brice, superintendent. Lands, 21 claims, on
Mountain, south of Needles, 7 miles from a railroad, showing

veins, up to circa 75′ in width, carrying promising copper and gold outcrops. Has a 175′ vertical shaft, cutting an 18′ vein carrying about 5% copper and $20 gold per ton. Has gasoline power and hoist, with an air-compressor and buildings. Shall shipments, early 1908, to Needles smelter, returned 10.8% copper, 2 oz. silver and $20 gold per ton.

WHIPSAW COPPER CO. ARIZONA.

Dead. Apparently shareholders were whipsawed. Formerly at Prescott, Yavapai Co., Ariz.

WHITE BEAR CONSOLIDATED GOLD MINES, LTD. BRITISH COLUMBIA.

Dead. Reorganized, circa 1908, as Consolidated White Bear Mining Co., Ltd. Formerly at Rossland, Trail district, B. C. Described Vol. VII.

WHITE CANYON COPPER CO. UTAH.

Office: 624 Peyton Blk., Spokane, Wash. Capt. A. E. Wayland, secretary. Lands are said to be 13 claims, in San Juan County, Utah, on which company planned installing a leaching plant during 1908.

WHITE CHIEF MINING & MILLING CO. MEXICO.

Letter returned unclaimed from former office, 217 Sansom St., San Francisco, Cal. Mine office: Chinipas, Arteaga, Chihuahua, Mex. M. A. Newman, superintendent. Property is the San Miguel del Castillo mine, carrying auriferous copper ore. Has steam power and a 40-ton mill.

WHITE EAGLE COPPER MINING CO. TEXAS.

Dead. Lands sold for debt. Formerly at Burnet, Burnet Co., Texas.

WHITE GIANT MINING & SMELTING CO. ARIZONA.

Office and mine: care of G. M. Willard, manager, Jerome, Yavapai Co., Ariz. Lands, 5 claims, area 100 acres, known as the Allan Hoover group, in the Squaw Peak district, circa 25 miles south of Jerome, having several short tunnels and shallow shafts, deepest 70′, said to show galena assaying up to 55% lead and $100 gold per ton. Presumably idle.

WHITE HORSE MINING CO. ARIZONA.

Office: 20 Broad St., New York, N. Y. Mine office: Prescott, Yavapai Co., Ariz. H. R. Frost, president; preceding officer, L. D. C. Ferguson. Maj. R. G. Vassar, S. P. Ostrom and M. J. McGibbon, directors. Capitalization $2,000,000, shares $1 par. Bonds, $50,000. Lands, circa 200 acres, at Squaw Creek, and company also is said to have a group of claims, now idle, in the Walker district. Development is by 2 shafts and a tunnel. Equipment includes a 10-stamp mill. J. F. Wisner was fiscal agent.

WHITE KNOB COPPER CO., LTD. IDAHO.

Office: 36 Wall St., New York, N. Y. Mine office: Mackay, Custer Co., Idaho. Wilbur K. Mathews, president; A. M. Poole, secretary and treasurer. Organized originally under laws of West Virginia, as White Knob Mining Co., and reorganized, under present title, Apr. 24, 1900, under laws of New Jersey, and again reorganized, January, 1903, under same charter and title, and yet again reconstructed, 1904, with capitalization $2,600,000, shares $10 par, "once more yet again" reconstructed, or practically succeeded, circa January, 1907, by White Knob Copper & Development Co., Ltd., but apparently the White Knob Copper Co., Ltd., retains corporate existence, though, if so, it is a mere shell, as the mine has been sold to the Empire Copper Co., and the remaining assets apparently are held by White Knob Copper & Development Co., Ltd. For further particulars see White Knob Copper & Development Co., Ltd., in this volume, and White Knob Copper Co., Ltd., in Vol. VI., which descriptions explain, in detail, the miserable flounderings of this company and its predecessors.

WHITE KNOB COPPER & DEVELOPMENT CO., LTD. IDAHO.

Office: 36 Wall St., New York, N. Y. Mine office: Mackay, Custer Co., Idaho. Wilbur K. Mathews, president; Arthur Kennedy, vice-president;

Dupee, secretary and treasurer; preceding officers, Chas. H. Dupee and rdsell, directors.

anized Apr. 6, 1905, under laws of Maine, with capitalization 00, shares $10 par, fully issued, in $2,000,000 cumulative 7% preferred nd $4,000,000 common stock, preferred stock being convertible into at option of shareholders. Company was organized as successor of Knob Cooper Co., Ltd., assets of which are said to have been sold, under ure, and bought in by holders of securities. Present company is said taken over the properties and assets of the White Knob Copper Co., New Jersey, exchanging share for share, plus a $3 assessment. Appa- he White Knob Copper Co., Ltd., of New Jersey, retains a corporate e.

give even a remote understanding of this crazy-quilt patchwork corpo- it is necessary to outline the history of the various preceding White orporations, all under the same general management—if such a respect- rd as management can be misapplied to such gross mismanagement as poration and its predecessors have suffered, from birth.

is doubtful if in the history of mining there is a finer example of utter tency than is afforded by the spectral succession of White Knob corpo- organized in various states, and at frequent intervals, all born with onstitutions, but all, unfortunately, retaining sufficient vitality to pass o their progeny the scrofulous taint with which the first was endowed. e White Knob Mining Co., which seems to have been the ancestor of the decrepit family of White Knobs, was organized, circa 1899, under the f West Virginia, with capitalization $5,000,000, and was reorganized, , 1900, under laws of New Jersey, as White Knob Copper Co., Ltd., with ization $12,500,000, which corporation was reorganized, January, 1903, he same title and charter, with capitalization reduced to $2,000,000, and ain reconstructed, 1904, with capitalization $2,600,000, shares $10 par, parently was succeeded, or at least was rendered a mere shell, Apr. , by the White Knob Copper & Development Co., Ltd., which is the corporation, though how long it may be for this world the rashest t scarce would care to guess, in view of the family history.

e various White Knob corporations expended circa $3,000,000, on the ty in Idaho, to most excellent disadvantage, the policies of the White being consistent only in their utter inconsistency. Mining officials were d repeatedly; reorganization followed reorganization; stock was increased ecreased, and again increased and decreased; bonds were authorized, and redeemed; the smelter was blown in, blown out and again blown in, t, repeatedly; local officials were changed so frequently that it scarcely be an exaggeration to say that nearly every position had three incum- —one going, one on the job, and one coming. Such a witches' dance ancial and technical lunacy would be difficult to describe adequately. t one time, in 1905, the smelter at Mackay was partially dismantled, with tention of removing it to Shasta County, California, where the company ed it had bought control of the Balaklala, but control of the Balaklala old twice, and the White Knob holdings of 50,000 shares of Balaklala said to have been sold, February, 1906, at an average price of about $9 hare. Circa 1906 the company gave a 5-year lease, on its mine and r, without royalty, to the MacBeth Lease, Inc., the company being in a bad way financially, and this lease was sold, circa 1907, to the Empire r Co., which also bought the mine and smelter, the White Knob sup- y receiving, in return for its own property, a 25% share interest in the e Copper Co., a proceeding questionable on its face, but actually to the ny's benefit, as the White Knob management is far better off owning a

25% interest in any mine under control of competent men, than to own the mine and smelter entirely, if under its own desperately inefficient management.

The company is supposed to control the Mackay Development Co., Ltd., which furnishes water for the Empire smelter and the town of Mackay. Company also is said to control, through stock ownership, the Argonaut Mining Co., of Jackson, Amador Co., California, having a gold mine with a 40-stamp mill. Apparently the company no longer has a share interest in the Balaklala.

Apparently the present corporation received a $3 assessment from at least a portion of the old shareholders, who shut their eyes and took another chance on the management. It has been said that, when Poole resigned, there was in the treasury circa $450,000 in cash, but the company's annual report, filed Oct. 8, 1907, with the State of New York, claimed that its debts did not exceed $25,000, with assets "of at least $2,000,000," the assets presumably being share interests in other mining corporations, value of which is uncertain.

The management of the company promised information to the minority shareholders, but failed to keep its word, and the minority shareholders, having failed in various attempts to obtain information regarding the company's finances, filed, through Geo. A. Hobe, et al, circa November, 1908, in the Maine supreme court, a bill of equity, asking permission to examine the company's books and records. The company and its management are viewed with utter disgust, and the shareholders with derision.

WHITE KNOB MINING CO. IDAHO.

Dead. Reorganized, 1900, as White Knob Copper Co., Ltd. Formerly at Mackay, Custer Co., Idaho.

WHITE PINE COPPER CO. NEVADA.

Dead. Was merged, Nov. 17, 1904, in Nevada Consolidated Copper Co. Formerly at Ely, White Pine Co., Nev.

WHITE PINE MINE. MICHIGAN.

Office: care of St. Mary's Mineral Land Co., owner, 701-199 Washington St., Boston, Mass. Mine office: Ontonagon, Ontonagon Co., Mich. Lands, 80 acres, in Section 5, T. 50 N., R. 42 W., circa 3 miles east of the Nonesuch, having 4 pits and a 170' shaft, supposedly sunk on the Nonesuch lode. Is under option to the Calumet & Hecla, and was tested, 1907, by diamond drill borings, which are said to have shown a promising copper bed.

WHITE QUAIL COPPER CO. COLORADO.

Dead. Was merged Oct. 21, 1907, in Doyle Consolidated Mines Co. Formerly at Hesperus, La Plata Co., Colo.

WHITE ROCK COPPER MINING CO. CALIFORNIA.

Dead. Formerly at Lewis, Mariposa Co., Cal. Described Vol. VI.

WHITE TANKS MINING CORPORATION. ARIZONA.

Office: 740 Land Title Bldg., Philadelphia, Pa. Works office: Wickenburg, Maricopa Co., Ariz. Lands, known as the Bert Ford group, are in the White Tanks Mountains, circa 40 miles west of Phœnix. Has a smelter with 50-ton water-jacket blast-furnace, but operations proved unsuccessful. Idle several years, and apparently moribund.

WHITEWATER MINING CO. NEW MEXICO.

Mine office: Tyrone, Grant Co., N. M.

WHITNEY REDUCTION CO. NORTH CAROLINA.

Mine office: Gold Hill, Rowan Co., N. C. Lands adjoin the Union. Long idle.

WICKENBURG SMELTING & REFINING CO. ARIZONA.

Dead. Formerly at Wickenburg, Maricopa Co., Ariz.

WIDIN COPPER SYNDICATE, LTD. BULGARIA.

Office: 88 Bishopsgate St. Within, London, E. C., Eng. Mine office: Belgradchik, Vidin, Bulgaria. W. H. Fowler, J. P., chairman; R. Sach, consulting engineer; A. Thorp, secretary. Organized June 24, 1907, under laws of Great

with capitalization £20,000, shares £1 par. Property is the Chtastie rea 250 hectares, held under lease from the principality of Bulgaria. lows 2 fissure veins, of 30″ average width, traceable 600′, carrying rite assaying up to 18% copper, 8 oz. silver and 2 dwts. gold per ton. short tunnels and 3 shafts, deepest 260′, showing circa 5,000 tons of last accounts.

BILL MINE. **MONTANA.**

ned by Anaconda Copper Mining Co.

ROSE MINING CO. **CALIFORNIA.**

ie office: Hoveek, Inyo Co., Cal. E. H. Goodpaster, superintendent. In the Panamint Mountains, have 2 shallow shafts, showing ore giving say values in copper, silver and gold, from selected samples.

LMI SILVER & COPPER CO. **MEXICO.**

ie office: Velardeña, Cuencamé, Durango, Mex. Louis Sandberg, superint. Organized under laws of Arizona, with capitalization $3,000,000. circa 1,500 acres, include the Santa Eulalia, Loma, Cuchereña and other ies, and an option on the Santa Ines mine. Is said to employ circa 0.

RD-ELY COPPER CO. **NEVADA.**

ce: 32 Liberty St., New York, N. Y. Letter returned unclaimed from mine office, Ely, White Pine Co., Nev. Organized circa 1906, as suc- of McKinley Mines Co., which succeeded the McKinley Mining & g Co., which succeeded the Canton Mining Co., these being the only s noted in connection with the property. Lands, 5 claims, known as rora group, scattered and apparently poorly located. The Aurora, for- worked as a gold mine, but showing copper ores in lower workings, has main shaft, with about 1,000′ of drifts. Idle, and company, by reason ad antecedents, is not regarded favorably.

OCKS' CLONCURRY SYNDICATE. **AUSTRALIA.**

ice: Eagle St., Brisbane, Queensland, Australia. Mine office: Clon- Beaconsfield Co., Queensland, Australia. Thos. Welsby, secretary. Capi- on £30,000, shares £37 10s. par. Property has 2 shafts, known as the and Jessie, of circa 100′ depth each. Has a small smelter, completed 07, and shipped, 1907, a little ore to Townsville. Idle at last accounts.

OCK'S COPPER MINES, LTD. **AUSTRALIA.**

ice: Brisbane, Queensland, Australia. Mine office: Cloncurry, Beaconsfo., Queensland, Australia. Thos. Welsby, secretary; Cecil Rae, smelter ntendent. Lands include the Jessie mine, having an 80′ shaft, which is ncipal property, and the Secret mine, worked open-cast. The smelter, in 1908, has a reverberatory furnace, treating ore averaging about 20% , after selection, and is said to be turning out high grade matte.

AM PENN MINING CO. **WYOMING.**

fice: Lewisburg, Pa. Mine office: Encampment, Carbon Co., Wyo. Hedding, president; J. W. Van Valzale, secretary and treasurer; S. E. , manager. Organized, 1903, under laws of Wyoming, with capitalization ,000, shares $1 par. Lands, 3 claims, area 60 acres, in the Upper Platte t, showing a 4′ vein carrying carbonate ores and chalcopyrite, opened 75′ shaft. Idle several years.

IAMS, FOSTER & CO. & PASCOE, GRENFELL & SONS, LTD. **WALES.**

ffice: Leadenhall Bldgs., Whittington Avé., London, E. C., Eng. Works Swansea, Glamorganshire, Wales. Property includes the Morfa copper and Middle Bank copper works, at Swansea, both old and successful n smelters.

IAMS LUMAN MINING CO. **WYOMING.**

ffice: Buffalo, Wyo. Mine office: Depass, Frémont Co., Wyo. Employs

ing free gold, copper ore and native copper in thin sheets ores being cuprite, melaconite, malachite and chalcocite, re copper, 5 to 10 oz. silver and $2 to $8 gold per ton.

Development is by shafts of 52', 30' and 420', and by tu 70' and 80', with circa 1,800' of workings. Equipment in gasoline plant, with a 15-h. p. hoist and a 2-drill air-comp 12 mine buildings, of wood, including 16x20' and 14x16' sho

Company plans deepening the shaft to 800', and maki ings, also adding an electric plant, taking current 16 mile dam. Company is operated as a close corporation, mone being furnished by about 10 shareholders. Property conside

WILLIE ROSE COPPER MINING CO.

Office and mine: Portal, Cochise Co., Ariz. M. D. Ta Towers, vice-president; C. F. McCord, secretary. Organi under laws of Arizona, with capitalization $1,000,000, shares 2 shallow pits, of circa 20' depth, No. 2 showing a 12' vein and lands have produced a 30-pound nugget of native copp

WILLOW CREEK COPPER & GOLD MINING CO.

Mine office: Thermopolis, Frémont Co., Wyo. Organize capitalization $500,000, by H. P. Minor, W. Armour Tho Gowan, Edw. E. Waltman and H. H. Bierman.

WILL SMELTING CO.

Office: 509 Ft. Dearborn Bldg., Chicago, Ills. Operatin ing Bldg., Phœnix, Maricopa Co., Ariz. Works offices: Wic Co., Ariz., and Quartzite, Yuma Co., Ariz. J. R. Deahl, pre superintendent. Property includes 5,400 acres of placer cla and a new-fangled dry-washing gold extractor, neither app ticular promise. Has a general store and hotel at Wickenl smelter at Wickenburg and a 50-ton smelter at Quartzite. leged to have sold 100,000 shares at 18¾ cents per share t in turn handed them out to the public for 50 cents per shar management have been made, and a receiver asked for.

WILMOT MINING CO.

Office: Calumet, Mich. Mine office: Ontonagon, On

Park, vice-president and secretary; Victor Schill, treasurer; Milo Schill, manager; preceding officers and Thos. McSteel, directors. Organized under laws of Arizona, with capitalization $1,200,000, shares $1 par.
nds, 3 claims, area 60 acres, in the Big Bug district, showing fissure arrying auriferous copper ore, opened by 4 shafts, deepest 50′, and by tunnel, on the strength of which openings the company estimated 0 tons of $50 ore blocked out, which is absolutely impossible. Has assays of 19.5% copper, 3 oz. silver and $4.30 gold per ton. Is not ly regarded. Presumably idle and moribund.

ALL MINING CO. **WASHINGTON.**

ne office: Chewelah, Stevens Co., Wash. C. T. Rigg, superintendent. tunnels, showing a 4′ vein of auriferous and argentiferous lead and cop-

W MOUNTAIN COPPER MINING CO. **NEW MEXICO.**

ice: 203 Broadway, New York, N. Y. Mine office: Deming, Luna Co., Employs 6 to 10 men. E. D. Middlekauff, president and treasurer; John her, vice-president; Harry C. Tilson, secretary; C. H. Clark, manager; Smith, mine superintendent. Organized Apr. 4, 1908, under laws of a, with capitalization $1,000,000, shares $1 par. Stock is listed on the Stock Exchange. Annual meeting, second Thursday in June.
ands, 16 claims, unpatented area 320 acres, also 40 acres of timber lands, s from a railroad, adjoining the Stimson mine and 2 miles south of the Dome mine, in the Florida district. Property shows chalcocite assaying pper, 6 oz. silver and $51.50 gold per ton, opened by tunnels of 30′, 40′ 0′. A carload shipment of ore gave smelter returns of 17 to 34% copper. ty was worked, in a crude way, in early days, by Indians and Mexicans, hipped some hand-picked silver-lead ore to San Francisco. Company ontinuous development.

SOR MINING & SMELTING CO. **ARIZONA.**

ine office: Superior, Pinal Co., Ariz. Property is the Windsor and Lobb , near the Lake Superior & Arizona. Presumably idle.

EBAGO MINING CO. **COLORADO.**

ine office: Central City, Gilpin Co., Colo. Has gold-silver copper ore.

IPEG MINES, LTD. **BRITISH COLUMBIA.**

ad. Formerly at Phœnix, Boundary district, B. C.

IPEG MINING CO. **WASHINGTON.**

ine office: Republic, Ferry Co., Wash. E. R. Fraser, general manager; ing officer, C. W. Clark, Archibald Wright, W. R. McCracken and Chas. , directors; Jos. L. Lancaster, superintendent. Lands, 8 claims, includ- e Hawkeye mine, adjoining the Belcher, on Lambert Creek. Mine has a cline shaft, connecting with a 1,070′ tunnel, showing a vein of 70′ esti- width, carrying auriferous and argentiferous chalcopyrite, associated considerable quantities of limonite, with smaller amounts of siderite, edrite, magnetite, pyrrhotite and marcasite. Has an ore-bin on the r railway, 600′ from the tower tunnel, facilitating shipment. Has e power and an 8-drill Leyner air-compressor. First shipment, made August, 1907, returned about 3% copper, ore carrying 35 to 40% iron. ded operations December, 1907.

NA COPPER CO. **MICHIGAN.**

ffice: 713-199 Washington St., Boston, Mass. Operating office: Hough- Mich. Mine office: Winona, Houghton Co., Mich. Chas. J. Paine, Jr., ent; E. B. O'Connor, treasurer; Dr. Lucius L. Hubbard, general manager; R. Seeber, superintendent; John Broan, mining captain; Frank Lukey,

rganized 1898, under *laws of Michigan*, with capitalization $2,500,000,

good millsite, at the mouth of the Misery river, with water availa
stream, and may build a mill in connection with King Philip Co

The main tract carries the outcrop of the Winona amygdaloid
wards of one mile. The mine was discovered, 1864, by a line
pits along the outcrop, and a single shallow shaft was then su
to entire lack of transportation facilities, little was accomplish
erty was let on tribute, 1880, but did not furnish sufficient mass
and was closed, until taken over by the present company, Apr
the old shaft was cut down, retimbered and deepened, and 3 ne
on the Winona lode, an amygdaloidal bed running 12′ to 46′
average width of circa 20′, striking N. 59° E., and having an a
about 50°. The Winona amygdaloid resembles the Baltic lode in
and also bears considerable resemblance to the Knowlton bed
green belt, carrying considerable epidote, calcite and quartz, v
amount of mass and barrel copper, bulk of the metal being fo
copper. Diamond-drill borings have located several other cuprif
the Winona tract, but none carried copper in payable quantities,

The mine is served by a spur from the main line of the
railroad, which passes nearby.

The older workings show mainly mineral of the finer grad
what heavier copper at depth, and the best ground is to the
ground conditions having improved during 1908. During 1907 t
2,232′ of new openings, and the mine ended 1908 with circa 5
ings. Shafts Nos. 3 and 4 are connected on the 3d and 4th lev
the first half of 1909 connections are to be made on several lev
territory showing considerable copper, the showing at the southe
mine being much the best. The mine has electric pumps, and
drills.

No. 1, the discovery shaft, in the NE. ¼ of the NE. ¼ of
52 N., R. 36 W., is 8x18′ inside of timbers, with 3 compartment
deep, with 4 levels opened, showing a little heavy copper and so
in the northern drifts, but was of little promise, and has b
circa 1901.

No. 2 shaft, 900′ northeast of No. 1, sunk at an angle of 72

estimated at 12 to 15 lbs. copper per ton. Work was discontinued, the shaft having sufficient opening for the present.

pment at No. 2 shaft includes a steel shaft-rockhouse, 40x70′ on the 06′ high, remodeled and improved, 1908, equipped with two 24x36″ Lake Farrell crushers and room for a third, pneumatic steel gates, e trolley cranes, and grizzlies having differential slopes, lower por- g quite flat, grizzlies feeding to crushers, with only one man required crusher.

4 shaft, circa 1,700′ southwest of No. 3 and about 400′ from the boundary, started June, 1906, is sunk on ground secured from the lip in rectifying lines. The shaft is sunk in the footwall, and was opened taneously sinking and raising. This shaft was showing good ground, nd of 1908. Equipment includes a steel shaft-rockhouse with two 'ortage Lake Farrell crushers, similar to those at No. 3.

No. 3 shaft, 900′ north of No. 2 and about 750′ deep, shows little f promise, and has been idle for some years. Old No. 4 shaft, the most, about 1,350′ northeast of No. 1, found nothing of importance has been idle for some years. Old No. 5 shaft, started on a wide idal bed located by diamond-drill, did not develop good ground, and ontinued at slight depth, some years ago.

central power plant, between shafts 3 and 4, has an Allis-Chalmers t 3-phase 60-cycle cross-compound generator, providing an alternating with a 535-h. p. induction motor direct-connected to two 250-h. p. rrent generators, speeded for 600 revolutions per minute, delivering rrent to No. 4 shaft of the Winona and No. 1 shaft of the King ach shaft having a 200-h. p. motor geared to the hoisting drum, each motor having a variable speed of 150 to 1,200 revolutions per minute. aft has an electric hoist good for 1,500′ depth, operating two 3½-ton orking in counterbalance, at a speed of 1,200′ per minute. The motor r set has 2 flywheels, of 20 tons weight each, their momentum caring ations in load, and also providing power for hoisting, for one hour e dynamo is closed down, if necessary. The electric generator set has gs of 11x33″, and 2 bearings of 9x27″, with oil pumped through them ate of 16 gallons per minute, automatically filtered and water-cooled, perfect lubrication. The central power-house also has a 40-drill g air-compressor.

engine-house, located midway between shafts Nos. 1 and 2, is 40x40′, frame on stone foundations, with corrugated iron siding and roof, a steam hoist, good for 1,500′ depth, operating shaft No. 2, and the hoist previously described for shaft No. 3, also an Ingersoll-Sergeant class A 2-stage straight-line air-compressor, and a smaller single-stage sor. Adjoining is the boiler-house, 40x48′, of steel frame on stone ions, with iron siding and roof, housing four 80-h. p. boilers. There is en coal-trestle, with tunnel beneath, leading to the boiler-house.

e mine buildings include a 20x40′ carpenter-shop, combination smithy chine-shop, 22x34′ general store, an office building, 2 boarding-houses arly 100 dwellings for employes, the dwellings being in a townsite by the company. There also is a sawmill, 30x70′, with a 42x66′ wing lers, and a 16x46′ wing containing a shingle-mill, the plant having a apacity of 20,000′ of sawed lumber.

oduction has been as follows: 1,036,944 lbs. fine copper in 1903; 646,025 1904; nothing in 1905; 278,182 lbs. in 1906; 1,285,863 lbs. in 1907; noth- 1908. For 1904 returns averaged 18.95 lbs. fine copper per ton of rock d. Production was resumed, with a leased head, at the Adventure mill, r, 1906, in which year 19,399 tons of rock stamped returned an average

Co., Wyo. L. Cavnah, president; Geo. E. House, vice-presider second vice-president; Wm. H. McAloney, secretary and treas Miller, general manager; preceding officers, Henry F. Power, W. H. Lippincott and G. G. Hodge, directors. Organized un oming, with capitalization $5,000,000, shares $1 par. Manager and company practically reorganized, Dec. 12, 1905.

Lands, 22 claims, area 404 acres, on Silver Creek in the Sulphur Mountains, of the Sunlight district, in the northweste Horn county, about 12 miles east of the Yellowstone Nationa bered, with water power available, showing porphyry and and well mineralized quartzite veins of 10′ to 25′ estimated aver ing auriferous and argentiferous chalcocite, bornite and chal old management to give assays of 15 to 52% copper, 11 to about $1 gold per ton, and said by new management to give 56%, with an average of upwards of 40% copper, and $10 to $ and silver values per ton, presumably from carefully selected tunnels, No. 2 being 254′ in length at last accounts, planned system at depth. Property considered promising by Prof. H. Geologist of Wyoming. Apparently idle except for assessmen

WINONA-REX COPPER MINING CO.

Office: Winona, Minn. Letter returned unclaimed fr office, Encampment, Carbon Co., Wyo. John Ludwig, preside years and apparently moribund.

WINTHROP MINE.

Owned by Frontenac Mining Co.

WISCONSIN & ARIZONA MINING CO.

Office and mine: care of M. H. Ryan, president and supe cott, Yavapai Co., Ariz. J. L. Jacquot, vice-president; E. G. Dr. Donald McIntyre, treasurer. Organized December, 190 Arizona, with capitalization $1,000,000, shares $1 par. Lands, as the Copper King group, 4 miles north of Poland. Has shaf 50′, also a short tunnel showing a 5′ vein carrying 6″ string auriferous and argentiferous ore. Presumably idle.

s, 6 claims, area 120 acres, and a 5-acre millsite, in Town 15 North, West, one mile from the Missoula river and about 14 miles up the Superior. Property shows 2 fissure veins, in quartzite, estimated by as of 70' average width, carrying azurite and chalcopyrite giving 2 to 25% copper, opened by a 24' shaft and by tunnels of 75', 700', and 35'. Company plans continuous development.

SIN-WYOMING COPPER MINING CO. **WYOMING.**

. Formerly at Encampment, Carbon Co., Wyo. Described Vol. VI.

ER BERG- UND HÜTTENWERKE **GERMANY.**
TIEN-GESSELLSCHAFT.

e: Köln, Germany. Mine office: Wissen-am-Sieg, Rheinprovinz, Ger- apitalization, 8,000,000 marks. Is an extensive producer of iron ore, ut having been 109,483 metric tons of spathic iron ore and 1,092 metric re of 10% copper tenor. Employs circa 1,000 men.

) COPPER MINING CO. **WASHINGTON.**

e office: Chewelah, Stevens Co., Wash. L. Bryant, manager; H. A. kirk, superintendent. Property shows a vein of 25' estimated width, a 3' paystreak of smelting ore, balance consisting of ore of concen- grade.

TT COPPER MINING CO. **VERMONT.**

e office: Wolcott, Lamoille Co., Vt. Organized, circa 1900, with capi- n $500,000, shares $1 par. Idle several years and apparently moribund.

CREEK COPPER MINING CO. **MONTANA.**

e: Spokane, Wash. Mine office: Wolf Creek, Lewis & Clark Co., R. E. Vincent, A. M. Baldwin and P. S. Duchemin, directors. Mine nnel, said to show a 14' vein of ore carrying 20% copper.

AM COPPER CO. **ARIZONA.**

e: care of Benj. Blanchard, general manager, Prescott, Ariz. Mine Parker, Yuma Co., Ariz. Presumably idle.

ERINE & ARIZONA DEVELOPMENT CO. **ARIZONA.**

d. Reorganized, March, 1904, as Wolverine & Arizona Mining Co. y at Bisbee, Cochise Co., Ariz. Very fully described Vol. IV.

ERINE & ARIZONA MINING CO. **ARIZONA.**

e: Laurium, Mich. Mine office: 61 Mason Hill, Bisbee, Cochise Co., John Daniell, president; Paul P. Roehm, vice-president; Edw. Ulseth, vice-president; W. Frank James, treasurer; preceding officers, Chas. eth, Benj. F. Chynoweth, W. H. Brophy, Fred C. Smith and Michael J. ham, directors; Hon. Wm. R. Oates, secretary; W. H. Roberts, Jr., endent.

anized March, 1904, under laws of Arizona, as successor of Wolverine na Development Co., with capitalization $3,000,000, shares $15 par; 97,156 shares, par value $1,457,340, subject to assessment, and 21,792 par value $326,880, of full paid stock. Levied 25-cent assessments March 6, Sept. 17, 1906, June 17, 1907, and Nov. 18, 1907. Annual meeting, Wednesday in November.

e preceding corporation, the Wolverine & Arizona Development Co., and disbursed $223,433.93. Receipts of present company, to Dec. 31, ere $148,522.73, and for 11 months ending Jan. 1, 1907, disbursements 46,289.37. For fiscal year 1908, receipts were $27,131.32, with expendi- f $22,581.31, leaving a cash balance of $4,550.01.

nds, 9 claims, area circa 160 acres, known as the Cairo, Memphis, Ken- Georgia, Louisiana, Chicago, Warren, George and Broken Promise. The claim lies 600' from lands of the Calumet & Arizona, and is about 3,000' e Irish *Mag shaft of that company*, and from the Spray and Holbrook

shafts of the Copper Queen. The Uncle Sam and White Tail Deer claims of the Copper Queen are adjacent to the Wolverine & Arizona, and good ore was taken by leasers from the White Tail Deer claim, about 800′ from the Wolverine shaft. Final payments on lands were made Jan. 30, 1907.

The company conducted extensive exploratory work on the Broken Promise claim, which proved true to its name. The shaft on the Broken Promise claim is 700′ deep, with 3 compartments, each 5′x4′6″, well timbered, cutting limestone showing considerable iron. The shaft proved very wet, at depth, and has Nos. 7 and 9 Cameron sinking pumps, and a 500-gallon station pump. A drift on the 500′ level, running 850′ toward the Pittsburg & Duluth group of the Superior & Pittsburg Copper Co., has cut leached ore and ledge matter carrying traces of copper. Drifts running in other directions have shown leached ore, in encouraging quantities, but no ore of workable grade was developed, from the Broken Promise shaft, until 1908, when a drift cut an 18″ vein of silver-lead ore, estimated at $56 value per ton, near the centre of the Warren, or Bootleg, claim. Management plans continuing the drift, 1909, into and through the George claim, in the hope of finding oxidized ores that should lie above the sulphide ore bodies found in the Shattuck-Arizona mine, adjoining. During 1908 work was confined to extending the 300′ level drift to length of circa 2,000′, work being suspended on the 500′ level, to avoid water, which apparently is a mistaken policy, as the principal ore bodies must be gone after at depth.

The lands of the Wolverine & Arizona lie partly on the high hill west of Bisbee, but development was begun on the talus of the 500′ mural escarpment which forms the western side of the hill. Exploratory work to the west of the cliff proving disappointing, diamond drill borings of 2,694′ aggregate depth were made, 1906, on the hill, the last hole, at depth of 410′, passing through 50′ of oxidized ore, of 4 to 10% copper tenor. The ore body so located being inaccessible from the Broken Promise shaft, except under tremendous disadvantages, arrangements were made for use of the Higgins tunnel, on the Twilight claim, reaching this ground from the Bisbee side of the hill, as the ore found was located on 2 claims near the Shattuck-Arizona. Under this arrangement the old Higgins tunnel was extended 310′ through Higgins ground, to the Wolverine boundary, and was continued in a southerly direction, on Wolverine lands, during 1908. The nearest workings of the Broken Promise shaft are circa one-half mile distant, and about 500′ lower. An incline was started, October, 1907, at a distance of circa 2,700′ from the portal of the Higgins tunnel, and, during 1908, a body of oxidized ore, of about 8% average copper tenor, was proven by 497′ of workings, estimated to show 150,000 tons of ore, averaging circa 7% copper, which estimate seems unduly high, but it was estimated, at end of 1908, that these workings exposed circa $500,000 worth of ore, which estimate seems warranted.

Equipment includes a 260-h. p. steam plant, with 2 single-drum hoists and a 6-drill air-compressor. Buildings include a 25x50′ engine-house and office, bunk-house, boarding-house and a 10,000-gallon water-tank, water being pumped from Naco, 8 miles distant. All surface improvements are at the Broken Promise shaft.

Property is considered valuable, but the management should buckle down to business, and go after the ore in earnest, on a broad basis of operations, instead of confining operations to desultory exploratory work, maintained by the levying of irritating 25-cent assessments at irregular but frequent intervals. The Wolverine & Arizona has the makings of a mine, but it will require work, and cash to pay for it, to develop the property from a promising prospect to a regular producer.

formation, both east and west from the workings on the Kearsa
as far west as the Kearsarge conglomerate, which was absolutel
out, though it is known to carry some copper on the Ahmeek a
erties, to the northward. The west lode gave a little encourage
level crosscut, and may be tested further, in the future.

The mine has 5 Knowles electric pumps, of which 3 are
with one each in No. 3 and No. 4, three of these pumps having
of more than 1,000′ each. Current is taken from the Houghton
Light Co., and the electric pumps have given much relief to the
The mine has the Johnson electric hoisting signal system, bein
Superior copper property to use electric signals throughout.

The system of underground rock-handling, introduced circa
fusion and cash. Tram-cars to the average number of 10 a
level. Trammers leave the full cars at the shaft, and 2 me
dumping in each shaft, these starting at the topmost level wh
progress, and working downward, dumping all loaded cars o
order, then riding, on skips, to the topmost producing level, a
work. By this system, all signaling in each shaft is in the han
the engineers in charge of the hoists know exactly what is
ground.

No. 1 shaft, near the Kearsarge line, shafts being numbere
south, ran into the boundary at shallow depth, and, tributar
worked out, the shaft was abandoned, some years ago.

No. 2 shaft, next south, permanently bottomed at the bo
of 1,700′, is used exclusively for handling men and supplies. T
has a duplex-cylinder hoist with straight-face drum.

No. 3 shaft, sunk in the footwall, ended 1908 bottomed a
and can be sunk to depth of 4,300′, owing to exchange of la
Wolverine and the North Kearsarge mine of the Osceola Co
wooden shaft-rockhouse, burned March 3, 1906, has been rep
structure, duplicating that of Mohawk shaft No. 4, in design
This shaft has an engine-house with duplex-cylinder hoist hav
drum.

No. 4 shaft, bottomed on the 30th level, at the end of 190

American automatic stoker and Green fuel economizer. At No. 3 there
el changing-house. There is a private telephone system, with 20 instru-
onnecting the underground pump-stations and principal buildings on
with the central exchange in No. 3 engine house. The company main
3-ward hospital, with medical and surgical staff, for employes and their
The company owns a large number of substantial dwellings, and the
ation is exceptionally neat and prosperous in appearance.
k is transported to mill by the Mohawk & Traverse Bay railroad, with
grade haul of 13 miles.
mill, completed 1902, is near the mouth of Tobacco River, on Traverse
ke Superior, adjoining the Mohawk mill, both served by a single pump,
naged by a joint superintendent. The mill, 180x206' in size, of steel on
undations, standing 37' above the lake level, has 2 Nordberg heads,
circa 550 tons daily capacity, at 110 blows per minute. It has been de-
compound both heads, and work on the first was under way, late 1908.
makes extensive use of Wilfley tables, and has a completely appointed
-shop. Mineral from the heads and wash is sluiced to the basement
iron pipes, going for reduction to the works of the Michigan Smelting
Houghton. To care for tailings there has been installed a Jackson tail-
stem, which provides for the settling out of water and stacking of
800' from the mill, by a belt-conveyor. A practically similar system,
Mohawk, has given very good results.
boiler-house, just south of the mill, is 42x58', with stone walls and
ss roof, housing a battery of 200-h. p. Stirling water-tube boilers, fitted
tomatic stokers. Coal goes through a lump-crusher, thence to hoppers
24 hours' storage capacity.
pump-house, owned and operated jointly by the Wolverine and Mo-
as a 20,000,000-gallon Snow horizontal triple expansion pump, with
' and 54" steam-cylinders, and 22" water plungers, with 36" stroke.
s an 8,000,000-gallon Nordberg triple-expansion water-end pump, with
ers, used as an auxiliary. The pump-house is located on the river, near
th, the intake pipe being protected by timber cribs running 300' into
, preventing clogging from floating bark and anchor ice.
connection with the mills there is a wharf, owned jointly by the Wolver-
Mohawk, fitted with coal-hoists. A 40 acre townsite, platted near the
named Gay, in deserved honor of Jos. E. Gay, the president of the com-
ng and honorably identified with honest and successful copper mining
ises of the Lake Superior district.
duction for recent years has been as follows: 9,024,034 lbs. in 1903;
5 lbs. in 1904; 9,464,418 lbs. in 1905; 9,681,706 lbs. in 1906; 9,272,351
1907. For fiscal year 1908, the mine hoisted 367,795 tons of rock and
ed 18,935 tons, or 5.15%, stamping 348,860 tons, which yielded 12,117,000
neral that returned 9,356,123 lbs. fine copper, an average return of
, or 26.82 lbs. fine copper per ton. Costs for fiscal year 1908, were $1.62
for rock hoisted, and $1.71 per ton for rock stamped, and finished copper
de for 6.379 cents per pound, at the mine, with total costs of only 7.321
er pound, rendering the Wolverine the lowest cost copper producer of
uperior. The management of the Wolverine is as good as that of any
operation.

ERINE MINING CO. **UTAH.**

ad. Was wound up, by receiver, circa 1908. Formerly at Park City,
Co., Utah. Fully described Vol. VI.

ERINE MINING & LEASING CO. **COLORADO.**

ce: Niles, Mich. Mine office: Laramie, Larimer Co., Colo. W. S. Leland,

Mine office: Kelvin, Pinal Co., Ariz. Lands were 17 clai
Saddle Mountain and Troy-Manhattan, held under a $60,000
Idle and presumably out of business.

WORLD'S FAIR MINE.

Office: care of Frank & Josephine Powers, owners, Nogal
office: Patagonia, Santa Cruz Co., Ariz. Lands, 13 claims,
south of Patagonia, in the eastern end of the Salero Mountains.
a 600′ main shaft, with about 2 miles of workings, on an 8′ or
mainly highly argentiferous lead carbonates and sulphides
changing at depth to argentiferous copper sulphides. Prope
shipper, since circa 1893, of high grade ore, in carload lots,
value from $250 to $350 per ton, one 20-ton carload returning
is popularly reputed to have produced upwards of $500,000 wor
duction, 1907, was 16,733 lbs. fine copper, 106,627 oz. silver a
Suspended operations Oct. 5, 1907, on account of low price of co

WORLD'S FAIR MINING CO.

Dead. Lost lands to former owner, Frank Powers. Former
Santa Cruz Co., Ariz.

WRIGHT & LAWRENCE MINING CO.

Office: 8 Jackson Blvd., Chicago, Ills. J. T. Fortin, pre
chardt, vice-president; A. W. Nelson, secretary; Alex J. Liljestro
ent and general manager. Capitalization $1,500,000, shares $1
claims, area 220 acres, in the Doyle district of Riverside cou
said to have about 250′ of workings. Was a mere bit of rotte
as promoted, but present management apparently was not resp
deliberate swindles perpetrated by the original officers. Proper
favorably.

WRIGHT-RUSSELL COPPER MINING CO.

Office: 109 South 11th St., Lincoln, Neb. Letter returned
former mine office, Battle, Carbon Co., Wyo. J. H. Westcott, p
Dorgan, vice-president; John P. Dorgan, secretary; John B. Wr
H. M. Rice, general manager. Capitalization $1,000,000. Idle
moribund.

uprite, melaconite and chalcopyrite, in a gangue of calcspar and
n. Idle some years.

T COPPER CO. **MICHIGAN.**

68 Devonshire St., Boston, Mass. Operating office: Houghton,
ne office: Winona, Houghton Co., Mich. Employs 25 men. John C.
esident; M. A. O'Neil, vice-president; Chas. E. Adams, secretary and
preceding officers, Jos. Dorr and Matthew Van Orden, directors;
Van Orden, superintendent; Louis LaRochelle, mining captain. Or-
b. 3, 1899, under laws of Michigan, with capitalization $2,500,000,
par; paid in, $8. Has levied assessments of $200,000 since organiza-
ursements, for fiscal year ending March 30, 1908, were $25,905,
h assets of $37,144.17, with liabilities of $1,834.17. Shares are listed
ton Stock Exchange. State Street Trust Co., Boston, registrar; Fed-
Co., Boston, transfer agent. Annual meeting, second Monday in May.
1,065 acres, adjoining the Winona, in Sections 16, 20 and 21, Town
Range 36 West. Exploratory work, begun February, 1899, has been
uninterruptedly, though hampered by the great disadvantage of a
burden. Early work was done in search of the Winona amygdaloidal
forts were made later to locate the southern extension of the Baltic
which attention was turned again to the Winona bed, and latterly
directed toward locating the extension of the Lake bed. Average
ne Keweenawan formation is N. 53° E., with average dip of 65°, and
ot lands carry the strike of the beds for about 1½ miles. The mine
fts, some of which are merely pits, with 2 shafts of considerable

haft, 1,000′ deep, located in the SE. ¼ of Section 21, Town 52 North,
West, is sunk in the footwall of the Winona bed, with a parallel
amygdaloidal bed 60′ distant, both broken, and of small promise,
wing occasional patches of well mineralized ground.

exploratory shaft, 8x10′, inside measurement, was sunk 350′ on a
eling the Winona lode, at a distance of 1,200′ This lode gave en-
t, when first opened, and diamond-drill holes gave good cores, but
suspended, until 1907, when the shaft was unwatered and deepened.
located in the SE. ¼ of Section 21, Town 52 North, Range 56 West,
ed, 1908, to 700′, and a crosscut, driven to the southeast, passed,
through an epidotal amygdaloid of circa 50′ width, carrying finely
d copper of promising appearance. There also is a footwall chute
width, heavily mineralized, where cut. The epidotal bed, at the end
l about 100′ of drifting, and gave an encouraging showing of copper.
pparently about 24′ in width, showed very little copper until the
as reached, where there was found 6″ to 12″ of heavy mass and
er, at the point cut, but drifts north and south show copper more
eminated through the bed, mainly as stamp-copper, rather than
s. The showing at this point is much the best that the Wyandot
cured.

aneous work of the past included a 102′ shaft sunk on a lean cuprif-
lomerate underlying the Winona bed; a 300′ shaft sunk on an
identified as the Elm River, which gave no promising ground, and
was done also, 1904-1905, on the Misery River lode, in Section 16,
orth, Range 36 West, on a 20′ amygdaloid carrying fine copper, but
value was developed at this point.

ition to underground work, extensive diamond-drill borings have
and drilling was in progress at the end of 1908, with holes pitched
of 55°, and further drill work is planned to be carried on, in Section

16. Several years ago Section 28, Town 52 North, Range 36 West, was optioned, and a vertical shaft sunk near the west quarter post, to depth of 250', and crosscuts driven in both directions, with a total of about one-half mile of workings. The horizon of the Baltic lode was crossed in this work, but the bed was found highly altered, as was the whole country in the neighborhood. Diamond drilling, 1904, gave a core, showing a little copper, from the hypothetical horizon of the Lake lode, but this was not considered important at the time. The ground is being gone over again, with a diamond-drill, and efforts will be made to locate the extension of the Lake bed and give it such test as circumstances may warrant.

Equipment includes a Lidgerwood hoist, good for 1,000', one Ingersoll-Sergeant and 2 Rand air-compressors, of 12 drills aggregate capacity, and boilers. Buildings include a machine-shop, smithy, warehouse, barns and about 12 dwellings. The Wyandot has worked faithfully, for a decade, under most discouraging circumstances, but with great economy and persistence, and the showing secured at the end of 1908 was much the best in the history of the property.

WYOMING & ALABAMA MINING CO. WYOMING.

Dead. Formerly at Tie Siding, Albany Co., Wyo.

WYOMING CONSOLIDATED COPPER CO. WYOMING.

Dead. Formerly at Encampment, Carbon Co., Wyo.

WYOMING COPPER CO. WYOMING.

Office: Jackson, Mich. Letter returned unclaimed from former mine office, Encampment, Carbon Co., Wyo. Lands are on upper Cow Creek. Idle and apparently moribund.

WYOMING COPPER & GOLD MINING CO. WYOMING.

Office: Alma, Kan. Mine office: Encampment, Carbon Co., Wyo. C. B. Henderson, president and manager; J. R. Henderson, secretary and treasurer. Organized under laws of Arizona, with capitalization $1,500,000, shares $1 par. Lands are said to have shown ore, from the Metal Chief vein, assaying 65% copper. Idle several years.

WYOMING COPPER & MINING CO. WYOMING.

Office: 115 Dearborn St., Chicago, Ills. Letter returned unclaimed from former mine office, Rawhide Buttes, Laramie Co., Wyo. Mark E. Bennett, president; Edwin Hall, vice-president and general manager; W. M. Gager, secretary. Organized Nov. 17, 1905, under laws of Wyoming, with capitalization $500,000, shares $1 par.

Lands, 35 claims, area 700 acres, in the unorganized Rawhide Buttes district, also 100 acres timber lands, showing country rocks of quartzite, schist and limestone, said to carry 14 contact veins, of which 4, of 5' average width, are opened by shafts of 30' and 245', showing malachite and azurite above, with sulphides in the lower workings, giving average assays of 8% copper, 4 oz. silver and $3 gold per ton. Mine has 810' of workings, estimated to show 20,000 tons of ore. Equipment includes a 40-h. p. steam plant, with hoist and 4-drill air-compressor, and 4 mine buildings. Nearest railroad is the Chicago & Northwestern, 12 miles distant. Idle.

WYOMING GOLD & COPPER MINING CO. WYOMING.

Office: Salt Lake City, Utah. Mine office: Lusk, Converse Co., Wyo. Organized 1906, under laws of Utah. Lands, 3 claims, circa 18 miles south of Lusk, in the northern part of Albany county, said to have a 30' shaft, showing an ore body assaying 16% copper, with gold values.

WYOMING MINING CO. WYOMING.

Mine office. Kirwin, Big Horn Co., Wyo. Titus Sheord, president; B. F.

YALE GOLD-COPPER MINING CO. **BRITISH COLUMBIA.**

Dead. Formerly at Rossland, Trail district, B. C.

YALE MINING CO. **BRITISH COLUMBIA.**

Mine office: Hedley, Boundary district, B. C. F. A. Ross, manager. Lands, 25 claims, area circa 1,250 acres, of which 2 claims, the Nickel Plate and Sunnyside, are worked. The Nickel Plate, primarily a gold and silver mine, carrying a little copper, has water and electric power, and is closely connected with the Daly Reduction Co., which operates the Nickel Plate mill of 40 stamps. Production, normally, is about 3,000 tons of ore monthly, and for 1907 was 31,756 tons, notwithstanding the loss of 3 months time.

YAMAGATATOKITO MINE. **JAPAN.**

Mine office: Nanataki-mura, Kazuno-gori, Rikuchu, Japan. Production, 1906, was 641,120 lbs. fine copper.

YAMATE MINE. **JAPAN.**

Mine office: Takigawa-mura, Kume-gori, Mimasaka, Japan. Is a very ancient mine. Ore is slightly argentiferous chalcopyrite, associated with pyrite, galena and sphalerite, with arenaceous clay gangue, occurring in quartz-diorite. Best grade of ore yields 10 to 13% copper. Latest recorded production, 1899, was 3,044 momme silver and 99,679 lbs. fine copper. Presumably idle.

YAMPA MINE. **UTAH.**

Owned by Tintic Mining & Development Co.

YAMPA SMELTING CO. **UTAH.**

Office: 214 Dooly Bldg., Salt Lake City, Utah. Works office: Bingham Canyon, Salt Lake Co., Utah. Henry Stearne, president; Chas. W. Saxman, general manager; J. C. Dick, general superintendent; G. W. Metcalf, smelter superintendent. Organized 1903, with capitalization $100,000. Is controlled, through stock ownership, by Tintic Mining & Development Co.

Property is a smelter, at Yampa, near Bingham Canyon, built 1904, and enlarged, 1906, to 1,000 tons daily capacity. The works connect with the lower end of the aërial tram of the Yampa mine. Structures include ore-bins, calcining building, furnace building, converter department and a power plant, all buildings having steel frames.

The calcining department has eight 125-ton McDougall calciners, each with 6 superimposed hearths having sets of rabbling arms and rakes, with a dust-chamber 18x30x60′, connecting with a 120′ brick stack. Calcining reduces ore from 30% down to 5% in sulphur tenor.

The furnace building has 3 blast-furnaces, and a main stack with extreme elevation of 287′ above the tuyeres. There are also 3 reverberatory furnaces, each having separate brick stacks The converter department, installed 1907, has 2 stands, with 16 shells, converting matte of 50% average tenor to blister copper, shipped for refining to Chrome, N. J.

Production was 4,699,765 lbs. fine copper 1906, and 5,001,255 lbs. in 1907, and late 1908 works were treating circa 900 tons of ore daily, of which about 300 tons was custom ore. The smelter is threatened with damage suits, on account of fumes, though the injury seems mainly imaginary. The works are modern in design and equipment, and management is good.

YANKEE CONSOLIDATED MINING CO. **UTAH.**

Office: 609 McCornick Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. John E. DuBois, president; Hon. J. E. Frick, vice-president; B. H. Lehman, treasurer; preceding officers, H. C. Edwards and Chas. J. North, directors; C. J. Canfield, secretary; Louis Merriman, superintendent. Organized July 8, 1898, under laws of Utah, with capitalization $500,000, increased, circa February, 1908, to $1,000,000, shares $1 par. Annual meeting, fourth

which assays are without verification, and probably will continue to lack competent indorsement till the end of time.

Development, begun 1901, is by 2 shafts and 8 tunnels, and, so far as can be learned, the mine has shown practically no ore.

Improvements include an engine and boiler house, office building and store. Company planned the installation of a hydro-electric plant and a concentrator, but failed to secure same.

The Yaqui Copper Co. was organized for the purpose of selling stock, and was a deliberate swindle, and the lying done by its original officers was of a monumental nature. The company claimed possession of the largest copper vein ever located, but was unable to produce the same for the inspection of visitors competent to judge. Mr. Sauntry, the president, who was not connected with the original management, is an experienced lumberman, and an excellent judge of pine timber. The secretary and treasurer is a manufacturer of time-recording machines, and the former superintendent, who was killed by the Yaqui Indians, is said to have managed a photograph gallery with signal success. Apparently an unsuccessful effort was made by the Greene Gold-Silver Co. to secure control of this property. The company is exceptionally hard up, with a considerable floating debt, and is constantly pleading to shareholders for funds, and, March 21, 1908, issued a mimeographed letter to shareholders, offering the company's note for one year, in order to raise $1,600, to pay back salary due the widow of the late superintendent. So far as can be learned the property is practically valueless, and the company practically bankrupt.

YAQUI RIVER CONSOLIDATED GOLD & COPPER CO. MEXICO.

Office: Nogales, Ariz. Mine office: Quiriego, Alamos, Sonora, Mex. W. H. Smith, secretary; Walter W. Strickland, manager.

YAQUI RIVER EXPLORATION CO. MEXICO.

Dead. Formerly at San Antonio de la Huerta, Ures, Sonora, Mex.

YAQUI RIVER GOLD & COPPER CO. MEXICO.

Office: Los Angeles, Cal. Mine office: Nogales, Magdalena, Sonora, Mex. Roy Stearns, president and general manager. Property is the Mina Verde, near Nogales.

YAQUI SMELTING & REFINING CO. MEXICO.

Works office: San Antonio de la Huerta, Ures, Sonora, Mex. A. E. Klauser, president; H. R. Klauser, vice-president; H. C. Gerver, secretary and treasurer; Henry Lockhart, Jr., general manager; preceding officers and A. V. Baumann, directors; Samuel James, smelter superintendent.

Lands consist of mining claims in the vicinity of San Antonio de la Huerta, 80 miles east of Torres and 60 miles below Campo Santo Niño, circa 20 miles from the nearest railroad, and a concession has been granted the company for a 40-kilometer aërial tram, to bring ore of various mines to its works.

The reduction plant, of circa 150 tons nominal daily capacity, includes a 2-story sampling mill, one reverberatory furnace and one Allis-Chalmers blast-furnace, latter specially designed to reconcentrate, smelt and refine auriferous ores of both lead and copper. Local coke proving unsatisfactory, imported coke is employed for the blast-furnace, and wood is burned in the reverberatory furnace. The works have electric light.

Buildings include a machine-shop, smithy, laboratory, general store, hotel and an ice-plant. This is the only custom smelter in a rich mineral district, but adequate transportation facilities are lacking, and there has been great difficulty in operating the plant, owing to depredations of the Yaqui Indians.

LL MOUNTAIN COPPER CO. **COLORADO.**
e office: Steamboat Springs, Routt Co., Colo. Organized 1907. Lands, have been bought for $60,000, are on Yarwell Mountain.

AD YAURICOCHA, LIMITADA. **PERÚ.**
e and mine: Huarapampa, Yauyos, Lima, Perú. Mine carries argentif- pper ore. Was a small producer, at last accounts.

AI CONSOLIDATED GOLD-SILVER-COPPER CO. **ARIZONA.**
e office: Crown King, Yavapai Co., Ariz. W. C. Bashford, superin- Lands, 30 claims, 13 patented, including the Old Reliable mine, 3 om Crown King, opened 1875, which produced rich gold ores; the Wild group, in the Pine Grove district, and the Tiger group, in the Bradshaw ns. Properties have several thousand feet of old workings, showing a vein between porphyry and syenite, carrying slightly auriferous and rgentiferous copper ores. Has steam power and a 20-stamp mill, and l, at last accounts, to employ circa 100 men.

AI COPPER CO. **ARIZONA.**
ter returned unclaimed from former office, 317 Main St., Springfield, Mine office: Prescott, Yavapai Co., Ariz. Geo. Nightingale, president; k Carpenter, secretary. Organized circa 1900, with capitalization 00, shares $10 par. Lands, 25 claims, area 500 acres, about midway Prescott and Jerome. Idle some years, deeply involved in debt, and d.

AI DEVELOPMENT CO. **ARIZONA.**
d. Formerly at Mayer, Yavapai Co., Ariz.

IACION MINERA DE CLEMENTE YBARRA. **MEXICO.**
ne office: Promontorios, Alamos, Sonora, Mex. Clemente Ybarra, Jesús Maria Quijada, manager. Lands include the Almada, Terito, lo and Gloria mines, carrying auriferous and argentiferous copper ores, ed by shafts and tunnels.

ere are 2 small smelters, known as La Valenciana, which, 1903, pro- 9,200 kgs. blister copper, and Almada y Terito, which, 1903, produced gs. blister copper. Property is primarily a silver mine, copper being as a by-product. About 50 men are employed.

RA GOLD MINING CO. **MEXICO.**
fice: 132 Market St., San Francisco, Cal. Mine office: Calmallí, Sur, alifornia, Mex. A. J. Mayer, superintendent. Lands include the Buena- a, San Francisco and other mines, carrying auriferous and argentiferous ores. Has steam power and a 25-ton mill, employing circa 75 men at counts.

OW BUTTE COPPER MINING CO. **CALIFORNIA.**
ffice: care of W. P. Veuve, president, San Jose, Cal. Mine office: ood, Siskiyou Co., Cal. J. B. Ball, secretary; L. D. Ball, superintendent. ized 1907. Mine, 12 miles from Edgewood, on the eastern slope of Hay- Mountain, began ore shipments, early 1908, to Kennett smelter.

A NEW COPPER MINING CO., N. L. **SOUTH AUSTRALIA.**
line office: Wallaroo, Daly Co., South Australia. Presumably idle.

SEI COPPER CO., LTD. **SIBERIA.**
ffice: 269 Broad Street Place, London, E. C., Eng. Mine office: Rudnik Abakansk, Yenisei, Siberia. R. Van Gember, chairman; A. G. Terskoff, an agent; Norman J. Wallworth, secretary; Nicholas Henri de Goerke, al manager; Walter J. Stanford, mine superintendent. Organized Apr. 902, under laws of Great Britain, with capitalization £300,000, shares £1 issued, £214,400. Debentures, £5,543 issued. Has an £18,000 note out- ing.

Lands are 11 copper concessions, area circa 11,000 acres, including the Julia mine, also 10 coal concessions, and timber rights covering about 470,000 acres.

Work has been done on 2 copper claims, principal development being on the Julia, which has sundry old workings, with new shafts of 160', 100', 130', 50' and 250', property having been estimated, June, 1906, to have ore reserves of 70,000 long tons, of 5.5% average copper tenor, which was an overestimate, both as to reserves and tenor. Ore is now reported by company to average 3.4% copper, with about 4% sulphur, 30% silica, 10% magnesia, 17% iron oxide and 34% calcium oxide. Ore is highly silicious and difficult of reduction, and, under test of actual smelting, returned only 3.08% copper.

The 100-ton smelter, one-fourth mile from the mine, blown in 1907, has a 36x120" Fraser & Chalmers water-jacket blast-furnace, rated at 100 tons, but which, in actual practice, treats only 60 to 75 tons daily, burning charcoal, which is scarce, and making matte averaging 40% copper tenor, which is broken in rolls and roasted with 3% fuel charges, in shaft-ovens, and brought up to metal of 88% copper tenor, which is shipped to Swansea for refining, product being copper of 99.75% copper tenor. Production was 563,319 lbs. fine copper in 1907, and circa 1,820,000 lbs. in 1908. The company has experienced serious labor troubles, and apparently suffers also from lack of adequate cash.

YERINGTON ASSOCIATED COPPER CO. NEVADA.

Dead. Was organized 1907, under laws of Arizona, with capitalization $1,500,000. Formerly at Yerington, Lyon Co., Nev.

YERINGTON-B. C. MINING CO. NEVADA.

Letter returned unclaimed from former mine office, Wabuska, Lyon Co., Nev. H. Hamlin, superintendent. Organized circa April, 1908. Lands, 8 claims, south of the Wabuska-Yerington, supposedly carrying southern extensions of ore veins of latter. Lands are said to show a 3' gold vein, and a prominent gossan carrying up to 20% copper, presumably from selected specimens. Company planned development by shaft. Idle.

YERINGTON CENTRAL COPPER CO. NEVADA.

Office: Salt Lake City, Utah. Mine office: Yerington, Lyon Co., Nev. J. J. Beatty, manager. Mine has a 250' three-compartment shaft, showing a 3' to 5' vein of chalcopyrite, claimed to assay about 10% copper, with a 4' hanging-wall paystreak of melaconite assaying up to 59.1% copper.

YERINGTON CONSOLIDATED COPPER CO. NEVADA.

Office: Salt Lake City, Utah. Mine office: Yerington, Lyon Co., Nev. Frank J. Hagenbarth, president; Windsor V. Rice, vice-president; Walter C. Orem, treasurer and general manager; J. H. Turner, secretary; preceding officers, Col. Enos A. Wall, John Dern and Wm. Keiting, directors; S. S. Arentz, superintendent. Organized circa February, 1907, with capitalization $5,000,000, shares $5 par. Lands, circa 225 acres, in 2 groups, known as the Copper King and Copper Deposit, said to lie between the Bluestone and Mason Valley mines and to show auriferous copper sulphide ore of good tenor.

YERINGTON COPPER CO. NEVADA.

Office: Hooper Bldg., Salt Lake City, Utah. Mine office: Yerington, Lyon Co., Nev. Chas. N. Strevell, president; J. H. Pennington, vice-president; C. D. Rooklidge, secretary; H. P. Clark, treasurer; D. E. McPherson, resident director; A. A. Marsal, superintendent. Organized circa July, 1906, under laws of Utah, with capitalization $1,000,000, shares $1 par.

Lands, 14 claims, circa 3 miles east of Yerington, showing a prominent gossan, traceable one-half mile, covering a contact deposit between porphyry and limestone, carrying carbonate ore assaying 15 to 20% in copper from surface to a depth of 125', when sulphide ore appears. Has a 25' sha

and a 400′ tunnel, said to show, on the 325′ level, sulphide ore of 6 to pper tenor. Has gasoline power, and a gasoline pump working against ead.

GTON COPPER KING CO. **NEVADA.**

ce: Salt Lake City, Utah. Letter returned unclaimed from former ice, Yerington, Lyon Co., Nev. Lands, known as the Craig group, north Bluestone, are said to have shipped a little high grade ore, under former ip. Idle.

GTON IRONSIDES COPPER CO. **NEVADA.**

ce: Salt Lake City, Utah. Letter returned unclaimed from former ffice, Yerington, Lyon Co., Nev. A. Hanauer, Jr., president; Wm. H. , vice-president; J. P. Spaulding, treasurer; J. H. Turner, secretary; ng officers, Ralph Bettinger and Chas. T. Rooklidge, directors; T. L. , superintendent. Capitalization $1,000,000, shares $1 par. Lands, circa es, north of the Nevada-Douglas and northwest of Yerington, having us pits and cuts, with one shaft and a tunnel on the Ironsides claim, a vein said to carry ore averaging 5 to 8% copper. Idle.

GTON KNOB HILL SYNDICATE. **NEVADA.**

tter returned unclaimed from former mine office, Yerington, Lyon Co., Apparently only assessment work was done. Idle and apparently mori-

GTON MALACHITE MINING CO. **NEVADA.**

ice: 214 Atlas Blk., Salt Lake City, Utah. Mine office: Yerington, o., Nev. Willard F. Snyder, president; Henry J. Meyer, vice-president; Ellingwood, treasurer; Grant Snyder, general manager; O. H. Sonne, uperintendent. Organized under laws of Nevada, with capitalization 00, shares $5 par.

nds, adjoining the Mason Valley mine, show a mineralized zone of 50′ width, between limestone and diorite, carrying some oxidized ores, but chalcopyrite, estimated to average 6% in copper tenor. Development tunnels and a 3-compartment shaft.

uipment includes an electric hoist, good for 600′ depth, an Imperial air- ssor and 7 air-drills. Company plans continuous development and ing shaft to 600′.

GTON MOHAWK COPPER ASSOCIATION. **NEVADA.**

tter returned unclaimed from former mine office, Yerington, Lyon Co., Organized circa April, 1907, under laws of Arizona, with capitalization 000. Idle.

NGTON NIPPER COPPER CO. **NEVADA.**

fice: 418 Atlas Blk., Salt Lake City, Utah. Letter returned unclaimed ormer mine office, Yerington, Lyon Co., Nev. Stephen H. Love, presi- Hon. Wm. B. Jeffs, vice-president and superintendent; David Kennedy, ry and treasurer; preceding officers, John C. Lynch, Lewis A. Jeffs, F. A. , Walter L. Maas and Jay T. Harris, directors. Organized circa April, Lands are in Mason Pass, between the Ludwig and Yerington-Ironsides.

NGTON QUEEN COPPER CO. **NEVADA.**

etter returned unclaimed from former mine office, Yerington, Lyon Co., Lands, 6 claims, area circa 120 acres, said to show ore assaying 7 to 40% r. Idle and apparently moribund.

NGTON RED METAL MINING CO. **NEVADA.**

ffice: 1 Masonic Temple, Reno, Nev. Letter returned unclaimed from r mine office, Yerington, Lyon Co., Nev. O. A. Dockman, president; J. H. , vice-president; J. F. Haley, secretary; E. F. Adams, treasurer and man-

YORK HARBOUR COPPER CO., LTD. NEW

Dead. Wound up, February, 1902. Formerly at York Ha

YORK HARBOUR MINE. NEW

Mine office: York Harbour, Birchy Cove, Bay of Islands, Lands, 4 claims, area 6,400 acres, also 26,880 acres of timber la holdings of 33,280 acres, on the west coast of Newfoundland. are diorite, with 12 known fissure veins in serpentine, of which of 50′ width, have been more or less developed, these showing pyrites, claimed to carry 3 to 18% copper, occasional zinc, up 0.5 to 4 oz. silver and 40 cents to $1.40 gold per ton. Developm of 54′, 64′, 70′ and 400′, with circa 2,000′ of underground work discovered circa 1870, but active development was not be Equipment includes a 250-h. p. steam plant, with 5 hoists, an air-compressor, engine-house, boiler-house, sawmill and 15 dwel a crusher, of 300 tons daily capacity, and a substantial wharf, o connected with the mine by a 5,000′ ground-tram, and is 14 mi the Newfoundland railway. Was last held by Humber Consoli Manufacturing Co. Idle.

YOSEMITE COPPER MINING & REDUCTION CO.

Dead. Formerly at Daulton, Madera Co., Cal. Described

YOSHIOKA MINE.

Owned by Mitsu Bishi Goshi-Kwaisha.

YOUNG AUSTRALIAN MINE.

Mine office: Wrightville, Robinson Co., N. S. W., Austral the Cobar district, was under development in 1908, and was a

YREKA COPPER CO. BRITI

Dead. Formerly at Yreka, Vancouver Island, B. C. Very Vol. VII.

YTTERÖEN MINE.

Mine office: Ytterö, Trondhjem, Norway. Property, whic the Meraker field, is a very small producer of cupriferous py corded production, 1903, was 1,300 tons of ore.

YUKON PUEBLO MINES CO.

ccasional streaks of rich ore, including native copper, cuprite, azurite, ite, bornite and chalcopyrite. All ores carry a little silver, and occa- gold. Management planned stripping the overburden and working the en-cast, which would seem a proper system. Property has been handi- by lack of railway transportation, now available, but shipped, 1907, to smelter, 700 tons of roughly selected ore, returning 5.65% copper and ilver per ton. Production, 1907, estimated at 100,000 lbs. fine copper. operty of considerable promise, with a good management.

UJI MINE. **JAPAN.**

ne office: Satokawa-mura, Nomi-gori, Kaga, Japan. Production was lbs. fine copper in 1906 and 940,926 lbs. in 1907.

ENSSKI MINE. **SIBERIA.**

ned by Spassky Copper Mine, Ltd.

ECAS & DURANGO MINING & SMELTING CO. **MEXICO.**

ad. Formerly at Chalchihuites, Sombrerete, Zacatecas, Mex. Described II.

ANHIA DA ZAMBEZIA. **PORTUGUESE EAST AFRICA.**

fices: 53 Rua do Alecrim, 1°, Lisbon, Portugal, and 10 Rue Lafayette, France. D. De Brito Capello, chairman. Organized May 20, 1892, under uese royal decree, with capitalization 2,700 contos do reis, shares 4,500 1) par; issued, 2,025 contos do reis. Property is a concession of 60,000 miles, on either side of the Zambesi and Shire rivers, extending east of to the coast, and embracing the ports of Quelimane and Chinde, Portu- East Africa. Concession includes copper-bearing fields of prospective and company plans organizing a subsidiary corporation to take over sup- spects at Macomba, Marabé, Boroma and elsewhere in its territories.

ONA DEVELOPMENT CO. **MEXICO.**

fice: 404 Trust Bldg., Los Angeles, Cal. Mine office: Minas Nuevas, s, Sonora, Mex. W. S. Cranz, president; W. L. Patterson, treasurer; Wm. man, vice-president; S. L. Bosford, secretary; Amos J. Yaeger, general er; preceding officers and R. R. Coleman, directors. Property is the ma mine, carrying native silver, silver sulphides and argentiferous chal ore values being mainly in silver. Has steam and electric power, and tamp mill having 4 Huntington mills and a 100-ton cyanide plant, latter d to be doubled in capacity. Employs circa 450 men.

EDAD FUNDICIÓN DE ZAPALLO DE QUILE. **CHILE.**

ffice: Ovalle, Coquimbo, Chile. Works office: El Zapallo de Quile, , Coquimbo, Chile. Organized July 12, 1904, under laws of Chile, with lization 53,000 pesos, shares 100 pesos par.

ERZ- UND KUPFERKIESBERGBAU ZAPFENSCHUH. **AUSTRIA.**

line office: Altzech Zapfenschuh, Tyrol, Austria. Is an old but small mine, g sulphide copper ores.

PÁN GOLD MINING CO. **MEXICO.**

Mine office: La Yesca, Ahuacatlán, Tepic, Mex. G. H. Bultolph, manager. rty includes the Zapopán and San Miguel mines, carrying auriferous zinc, and copper sulphides, values being mainly in gold. Has steam power, with yan mill and 30-ton cyanide plant, employing circa 100 men; at last ac- s.

PAÑIA MINERA ZAPOTECA. **MEXICO.**

Office: Laclede Bldg., St. Louis, Mo. Mine office: Orotlán, Durango, Mex. T. Riddle, president; P. K. Fitzgerald, secretary; Guillermo W. Thompson, ral superintendent; F. J. Twyman, assistant superintendent. Organized ary, 1903, under laws of West Virginia, with capitalization $1,000,000, es $1 par.

a small smelter.

GEWERKSCHAFT DER ZECHE THALBURG.

Dead. Formerly at Heiligenhaus, Rheinprovinz, Germany. D

ZELAYA HERMANOS.

Office and works: Paípote, Copiapó, Atacama, Chile. Wor
drical water-jacket blast-furnace.

ZELLER EHZBERGWERKE G. m. b. H.

Mine office: Altlay bei Zell a/M., Rheinprovinz, Germa
president. Produces argentiferous lead and copper ores, latte
tities only, employing circa 100 men.

ZENITH GOLD & COPPER MINING CO.

Dead. Formerly at Encampment, Carbon Co., Wyo.

ZENOLI SILVER-COPPER CO.

Office: Salt Lake City, Utah. Mine office: Palisade, E
E. O. Howard, president; P. C. Delmas, vice-president; W. M.
tary and treasurer; preceding officers, Jos. Lippman and J.
directors; P. D. Delmas, superintendent. Organized December,
talization $150,000, shares $1 par. Lands, 5 claims, opened by
a vein of 2′ to 6′ width carrying silver-lead ore at surface, chan
erous copper ore at depth. Has secured ore assaying up to 2
ton, and shipped a little ore, 1907.

ZIMAPÁN MINING & SMELTING CO.

Dead. Formerly at Zimapán, Hidalgo, Mex. Described V

ZOMEKI MINE.

Mine office: Ikuno-mura, Abu-gori, Nagato, Japan. O
argentiferous chalcopyrite and bornite, associated with sphale
pyrrhotite, occurring in lenses and fissure veins, near liparite d
clay-slate, sandstone and limestone. Presumably idle.

COMPAÑIA MINERA DE ZOMELAHUACÁN.

Mine office: Las Minas, Jalacingo, Vera Cruz, Mex. W.
Property is La Asecuncion de Maria y anexas, carrying aurifero
erous copper and lead ores. Has water power and a 15-stamp
circa 150 men.

ZONIA COPPER MINING CO.

SOCIÉTÉ ANONYME DES MINES D'AÏN-KECHERA. ALGERIA.

Office: 11 Rue Godot-de-Mauroi, IXe, Paris, France. Mine office: Philippeville, Constantine, Algeria. L. Pelletan, F. Urrity, E. Maurice, M. Martin and L. Schwob, directors. Organized Feb. 14, 1905, under laws of France, with capitalization f600,000. Lands carry complex argentiferous sulphide ores of zinc, lead, copper and antimony.

AKUTOZAWA MINE. JAPAN.

Mine office: Yokokawame-mura, Waka-gori, Rikuchu, Japan. Property, in the district of Iwate, produced 91,869 lbs. fine copper in 1907.

ALAMOS MINES CORPORATION. MEXICO.

Mine office: Alamos, Sonora, Mex. Property is the Promontorios mine, once a considerable producer of silver, said to have been worked, at intervals, for upwards of 200 years. Assays show ore carrying 7 to 24% copper, 4 to 8 oz. silver and $10 gold per ton. Company also owns the Plata Rey mine, area 10 hectares, 15 miles west of Alamos, showing a ledge said to be traceable 1,800', giving assays, from surface ores, of 4% copper and 130 oz. silver per metric ton, with variable gold values. Some small ore shipments have been made by present company to the Quintera smelter.

ALASKA DEVELOPMENT CO. ALASKA.

Office: Seattle, Alaska. Mine office: McCarthy Creek, Copper River district, Alaska. L. C. Dillman, general manager. Property is in the neighborhood of the Bonanza mine.

ALBANY COPPER CO. NEVADA.

Mine office: Buckskin, Douglas Co., Nev. J. E. Lutz, superintendent. Property has auriferous copper ores, under development, with gasoline power.

ALFRED MINES, LTD. ENGLAND.

Office: Perranporth, Cornwall, Eng. Mine office: Bolingey, Cornwall, Eng. F. Marshall, secretary; preceding officer, A. J. Swaab, and B. Reed, directors. Organized March 28, 1906, under laws of Great Britain, with capitalization £40,000, shares £1 par, fully issued and fully paid. Debentures, £5,000. Property is the New Wheal Leisure mine, carrying chalcopyrite and sphalerite.

ALICE DEVELOPMENT CO. COLORADO.

Mine office: Idaho Springs, Clear Creek Co., Colo. W. F. Shaffer, manager. Mine is opened by a tunnel, said to show a vein, upwards of 75' in width, of ore averaging about $4 per ton in copper, gold, and silver. Property has a 12-stamp mill.

ALLEN MINING CO. ARIZONA.

Office: Chicago, Ills. Mine office: Old Glory, Santa Cruz Co., Ariz. Lands are near the Oregon & Arizona Mining Co. Presumably idle.

ALLONGOSSUK MINE. GREENLAND.

Office: care of Nyeboe & Nissen, Bellevue, Raadhuspladsen, Copenhagen, Denmark. Mine office: Julianehaab, Greenland. M. Ib. Nyeboe, managing director. Property, in the extreme southern part of Greenland, about 50 miles west of Cape Farewell, was under development, 1909.

ALMA PROSPECTING SYNDICATE. TASMANIA.

Mine office: Forth, Tasmania. Lands include the old Barrington or Alma mine, above Wilmot bridge, west of the Forth River, opened circa 1880, at which time about £1,000 was expended on development. Property shows a strong gossan, and has a 35' shaft, with main development by a tunnel parallel with the gossan, which covers a contact deposit carrying a little chalcopyrite in barite, between slate and breccia of Cambrian age.

ALMONTE COPPER CO. NEW MEXICO.

Mine office: Hanover, Grant Co., N. M. Company was organized, with capitalization $100,000, by Albert G. Dunlap, D. E. Notley, J. Calvin Hess and Wharton Barker. Dunlap, who has a prison record, was arrested, June 24, 1909,

arge of obtaining money under false pretenses on account of this com-
s not regarded favorably.

A COPPER MINING CO. **MONTANA.**

ce: Wallace, Idaho. Mine office: Saltese, Missoula Co., Mont. C. W.
resident; Timothy Kelly, vice-president and manager; A. H. Feather-
ecretary and treasurer; preceding officers, Alex. Muir and A. P. Coch-
rectors. Lands, near the Monitor mine, and 2 miles from a tunnel on
cago, Milwaukee & Puget Sound railroad, are developed by 2 long
and a shaft, showing chalcopyrite assaying up to 34% copper, with
lver and gold values. Equipment includes several buildings.

BET COPPER CO. **ARIZONA.**

ie office: Courtland, Cochise Co., Ariz. Frank Armstrong, superin-
. Company was organized circa January, 1909. Cannot be learned that
rk has been done.

CONSOLIDATED MINING CO. **UTAH.**

id. Lands were owned, 1908, by Flagstaff Copper Mining Co. For-
t Alta, Salt Lake Co., Utah.

COPPER MINES. **MONTANA.**

ce: 60 Congress St., Boston, Mass. Mine office: Corbin, Jefferson Co.,
Apparently has some connection with the Alta-Montana Copper Co.,
asury stock was being offered, February, 1909, by Hewett, Wood & Co.,
on.

CORBIN COPPER CO. **MONTANA.**

ne office: Corbin, Jefferson Co., Mont. Organized circa January, 1909,
pitalization $1,000,000. Property is the Flambeau group, area 4 claims.

MONTANA COPPER CO. **MONTANA & NEW MEXICO.**

ne offices: Corbin, Jefferson Co., Mont., and Kelly, Socorro Co., N. M.
L. Hewett, general manager. Organized circa 1909, with capitalization
00, shares $10 par, apparently as successor or reorganization of Kelly
g & Refining Co.
w Mexico lands are known as the Kelly group. Montana lands, 12
including the Alta group of 8 claims, carrying about 1½ miles of the
mother lode of the Corbin camp, also 664 acres of placer ground, near
including a townsite. The Alta mine is claimed to have produced
ls of $30,000,000 from old workings in the past, mainly in silver, no
on having been paid to copper values, and the first smelter in Montana
ilt to treat the ores from the Alta and Comet mines. The management
reopening old workings on the 500′ level, and below, hoping to obtain
lver and copper values. In May, 1909, company was said to plan sinking
partment shaft to depth of 1,000′, and to plan adding an electric hoist
0-ton concentrator later in the season, but apparently the concentrator
to materialize. Is not regarded favorably.

N MINING CO. **CALIFORNIA.**

ine office: Needles, San Bernardino Co., Cal. R. C. Hamilton, president;
Freeman, secretary; M. Freeman, superintendent. Lands, 6 claims, north
f the Dunkirk and southeast of the Eagle, in the Whipple Mountains, 8
from the Colorado River. Nearest railroad point is Parker, 15 miles by
-road. Lands show schists, limestone, diorite and slate, with intrusive.
ore occurring in and near the dykes, which frequently are completely
orphosed. Ore bodies usually have a northwest and southeast strike and
oxidized copper ores having gold values and a little silver. Development
prospecting shafts, pits and an opencut, principal workings being a 50′
and a 300′ tunnel. Property is said to have yielded ore samples assaying
$35 per ton.

ALVIN DEVELOPMENT CO.

Office: Houghton, Mich. Mine office: Sal
son Pryor, president; Ward Smith, vice-presi
Wm. D. Calverley, treasurer; Albert Cronk
1908, under laws of Arizona, with capitaliza
the capitalization 25,000 shares went for pr
option on lease. Lands, 18 claims, area 360
group, one-half mile east of the Cobralla min
from Salome, in the Harcúvar Mountains.

Property shows limestone, alternating
schists dipping to the north at an angle of 45°
dykes, standing practically vertically and sho
a 100′ shaft, and some churn drilling was don
ing oxidized ores. Equipment includes a 60
mine buildings. Property considered promisi

AMALGAMATED ARIZONA COPPER CO.

Dead. Property was the Signal mine. Fo

AMAZON-DIXIE MINING CO.

Office: Wallace, Idaho. Mine office: Mul
Everett, president and general manager; H. E
J. Rossi, secretary and treasurer. Lands, 7 cl
be of 280 acres area, in which case they woul
and near the railway. Property shows a 4′ v
chalcopyrite and lead carbonates, associated w
mainly in galena. Development is by a 35′ sh
planned an 1,100′ tunnel, starting 2,000′ east o
700′. Management also planned damming Cop
and connecting with a new power-house by
also planned installing a 10-drill air-compres
pressor already on the ground. Equipment i

AMERICAN BANNER COPPER CO.

Mine office: Globe, Gila Co., Ariz. Prop
and not far from Miami, area supposedly 16
per group, is developed by 10 shafts and tun
by former owner, the Arizona Banner Copper
ore in sight, which estimate is considered to
1901, until taken over by present company, a
done by present corporation.

AMERICAN COPPER CO.

Mine office: Brighton, Salt Lake Co., Uta
Mining Co., in Big Cottonwood cañon. Presu

AMERICAN MINING & SMELTING CO.

Office: Spokane, Wash. Mine office: Tw
Husk, president; C. O. Cobbs, vice-president
Isham, engineer. Organized circa February,
capitalization $2,500,000, shares $1 par. Lan
ore assaying 20 to 30% copper, in a vein ho
said also to have bonded claims in the Prince
management has the husk and cobs, it is to b
the corn.

AMY SILVERSMITH MINING CO.

Office and mine: Butte, Silver Bow Co.,
zinc zone, to the north of the proven copper
several lessees were working, on the 300′ level

NDA-CORRAL CONSOLIDATED MINES CO. **ARIZONA.**
e office: Bouse, Yuma Co., Ariz. A. J. Kellis, superintendent. Lands, claims, in the Big Horn Mountains, near Bouse, showing high grade re and free gold.

-SIBERIAN CO., LTD. **RUSSIA.**
ce: 5 Fenchurch St., London, E. C., Eng. T. Blair Reynolds, chairman; hart, managing director; preceding officers, C. F. H. Leslie, A. J. Hugh nd S. G. Sheppard, directors; John Owler, secretary. Organized Dec. 6, der laws of Great Britain, with capitalization £100,000, shares £1 par. y floated the Perm Corporation, Ltd., to take over the Kyshtim prop- d the latter, 1908, promoted the Kyshtim Corporation, Ltd. Property Anglo-Siberian Co., Ltd. is a 50% share interest in the Kyshtim Cor- , Ltd.

ERSARY COPPER MINES, LTD. **AUSTRALIA.**
ce: Townsville, Queensland, Australia. Mine office: Herberton, Cardwell ensland, Australia. Organized August, 1909, under laws of Queensland, pitalization £40,000, shares £1 par; issued, 15,000 fully paid shares and hares 12s. paid. Company was organized to take over the New Anni- Copper Prospecting Syndicate, Ltd., and property is described under itle.

OPE MINING CO. **UTAH.**
ce: Provo, Utah. Mine office: Eureka, Juab Co., Utah. John D. Dixon, t; Arnold Dixon, secretary. Organized circa April, 1909, under laws of ith capitalization $50,000, shares 5 cents par. Lands, 3 claims. Cannot ed that any work has been done.

O MINING CO. **COLORADO.**
ce: Spirit Lake, Iowa. Mine office: Salida, Chaffee Co., Colo. C. W. president; A. E. Rose, vice-president and superintendent; John Bur- , secretary and treasurer; preceding officers, B. E. Nefzger and W. L. ey, directors. Organized under laws of Colorado, with capitalization 00, shares $1 par. Lands, known as the Tip Top group, are on the st slope of Mount Antero, in the Chalk Creek district, 4 miles from the n branch of the Colorado Southern railroad, and 25 miles northwest of Property has a vein of 4′ to 12′ width, with a claimed average of 6′, g mixed sulphides and oxidized ores, with assay values, in copper, gold er, up to $120 per ton. Property also has a vein 60′ from and apparently with the main vein, carrying auriferous and argentiferous copper, lead c sulphides, and also has various smaller veins.

CENTRAL MINING CO., LTD. **ITALY.**
ice: Finsbury Pavement House, London, E. C., Eng. Mine office: Aosta, J. Jones, managing director; P. Casparis, secretary; Francois Farinet, anager. Organized Apr. 20, 1907, under laws of Great Britain, with ization £50,000, shares £4 par, fully issued, with £11,250 vendors shares aid, and 1,250 shares 36s. paid. Lands, 495 acres, in the communes of my and Oyen, carrying ores of copper, lead and antimony.

HE MINING CO. **WASHINGTON.**
ine office: Nespelem, Okanogan Co., Wash. Lands, in the Moses district, veloped by a 100′ incline shaft and a 350′ tunnel, showing ore with a high footwall paystreak and quartz gangue, main ore body carrying 2 to 3% and about 5% lead, with some antimony and zinc, and occasional high in gold and silver. Company planned resumption, late 1908, but appar- property continued idle.

COPPER CO. **IDAHO.**
ine office: Lost River, Blaine Co., Idaho. Lands, in Caine's Cañon, carry

SOCIETA ANONIMA PER LE MINIERE APRILE.

Mine office: Santa Lucia del Mela, Italy. Salvator Property shows chalcopyrite and cupriferous pyrrhotite, la assays of 1.83% copper, 26.66% sulphur and 120 grams sil the chalcopyrite giving average assays of 9.96% copper an metric ton. Property was under development at last acco

APSLEY MINE.

Mine office: Perth, N. S. W., Australia. Francis Drak 5 miles from Perth, has been worked intermittently, unde since about 1875, and production, 1876, was 20 tons fine reopened, February, 1907, by a syndicate under the mar Longton, but operations were suspended shortly, and opti by Mr. Drake. The ore occurs as impregnations in schis walls, but the payable ore usually ranges 3′ to 5′ in widt by a 240′ shaft. On the 180′ level, for a length of 45′ and was chalcopyrite and sphalerite, associated with pyrite, assa and for 53′ on the 240′ level, with an average width of 7′ 6 7.92% copper. Ore carries up to 3 oz. silver per long ton, w Property considered promising.

ARIZONA-BOUSE COPPER CO.

Dead. Formerly at Bouse, Yuma Co., Ariz. Was reor as Little Butte Consolidated Mines Co.

ARIZONA & CHICAGO MINING CO.

Mine office: Cave Creek, Maricopa Co., Ariz. Lands, ore giving average assays of 9% copper, with considerable ues. Mine has about one-half mile of workings. Compan tion of a 10-stamp mill, at last accounts, March, 1909.

ARIZONA & CLEVELAND MINING CO.

Mine office: Dragoon, Cochise Co., Ariz. J. B. Ri Mine, opened to depth of circa 225′, shows ore carrying mainly in gold, silver and lead.

ARIZONA COPPER MINES & SHIPPING CO.

Mine office: Dragoon, Cochise Co., Ariz. Organized cir planned development by sinking a 500′ shaft, at last accoun

a smelter site. Geological conditions are markedly similar to those lanet and Clara mines. The Carnation ore body, traceable 2,000′, is l at 50′ to 100′ width, and the Eagle group shows veins of 5′ to 50′ ving assays of 4 to 25% copper and $2 to $20 gold per ton. The as a whole, has about one mile of workings, deepest circa 300′, show- ge amount of copper carbonates, with sulphide zone not yet reached. e group has incline shafts of 70′ and 300′, and 1,500′ of tunnels, show- derable ore of smelting grade, with several hundred tons of ore on s assaying 15 to 25% copper, and $5 to $20 gold per ton, planned pped immediately. The Walters crosscut tunnel cuts a 30′ vein, with 300′, assaying about 5% copper and $5 gold per ton. On the 200′ level rnation shaft an ore body of 50′ estimated width is said to assay 5% nd $5 gold per ton, carrying a 10′ paystreak estimated to average per and $6 gold per ton. Management plans building a 200-ton smelter Landing. Property considered promising.

A-INTERNATIONAL MINING CO. **ARIZONA.**

e office: Yucca, Mohave Co., Ariz. Fred W. Morrison, president. , about 12 miles east of Yucca, formerly was operated on a small copper.

A METALS CO. **ARIZONA.**

e office: Teviston, Cochise Co., Ariz. Hon. Chas. F. Dick, president. 40 acres.

A & MICHIGAN MINING CO. **ARIZONA.**

e: Calumet, Mich. Mine office: Globe, Gila Co., Ariz. Employs 40 apt. Jas. Chynoweth, president; Frank L. Van Orden, vice-president; ynoweth, secretary; Wm. B. Anderson, treasurer; preceding officers, . Nankervis and Anton Trojanovich, directors; Spencer W. Clawson, manager; Nels A. Nelson, superintendent.

nized December, 1908, under laws of Arizona, with capitalization 0, shares $10 par, divided into $150,000 full paid and $1,350,000 com- k, latter $1 paid in. Merchants & Miners Bank, Calumet, Mich., regis- nnual meeting, third Tuesday in January.

ds, 34 claims, area circa 620 acres, known as the Trojanovich group, g the Superior & Boston on the northeast and lying northeast of the Hawk mine of the Arizona Commercial. Property is held under a bond and lease, of which 10%, or $23,000, was paid Feb. 1, 1909, and $46,000, is due Feb. 1, 1910, with balance of 70%, amounting to , due Feb. 1, 1911. No assessment is expected until early 1910. Develop- by the 519′ vertical 3-compartment Telfair shaft, having a 210′ north and 225′ south crosscut on the 500′ level. Shaft was sunk through arrying leached iron with copper stains, and shows some specks of rite in diorite. The crosscuts show considerable pyrite, which also is ered in the shaft. Property is hoped to carry the extension of the Old n veins and the Black Hawk vein of the Arizona Commercial. The is a gallows frame. Improvements include 10 buildings, one a board- e.

NA-NEVADA COPPER CO. **ARIZONA.**

e office: Hillside, Yavapai Co., Ariz. Jos. L. Giroux, president and manager. Lands, on Copper Creek, circa 35 miles northeast of Hill- ken over from Copper Creek Development Co., are said to be 105 claims, 2 patented, 6 placer claims and a millsite. Mine has a tunnel, show ore of good average tenor, with copper values increasing in depth. rtation is by a poor wagon-road to Hillside, but it is proposed to con- railroad from Seligman, on the Santa Fé railway, to the mines, a dis- f 50 miles, over which it is said an easy grade is obtainable.

ARIZONA PROSPECTING & DEVELOPING C

Mine office: Wickenburg, Maricopa Co., uary, 1909. Property includes the Angel group the Vulture mine, having a 200′ shaft, with the Maricopa group. Both properties are said t in copper, gold and silver.

ARIZONA UNITED MINING CO.

Office: 1420 Chestnut St., Philadelphia, Cochise Co., Ariz. Alfred S. Miller, president; dent; A. Jackson Wright, secretary; David H. mick, superintendent; Wm. Robinson, mine supe 1904, under laws of Delaware, with capitalizati Arizona Consolidated Mining Co., and name ch ent title. Reconstruction was for purpose of re outstanding, and combining the ownership of preferred stock issued by the Arizona Consolida drawn and cancelled, present company having n gage or encumbrance of any sort, and cash is p is operated as a close corporation.

Lands, 21 claims, 18 patented, circa 7 miles on the Southern Pacific railway. Property incl lic or New Republic groups, 12 claims of whic Russell Consolidated Copper Co. Property was 1909. Lands show 5 ore bodies, of which 3, un in estimated average width, carrying carbonate ter, estimated by former company to average 8 ton. Sulphide ore was encountered at depth shafts.

The Republic mine, opened to depth of 550′, workings, has an incline shaft. The Mammot about 1,000′ of laterals and tunnels. The Chicor to show ore averaging about 15% copper and 7

Equipment includes a power plant with go Mammoth mines, an electric plant and 4 In Transportation is by a railway from Johnson to Southern Pacific line.

The 125-ton smelter at the Republic mine, ing Co., treats ore from the company's mine a and was blown in October, 1909, making only m

The Russell Consolidated is said to have pro quantities of rich carbonate ores of 30% aver 1907, was 245,040 lbs. fine copper and 3,122 oz. f and production, 1908, was about 12,500 tons of ton. Property considered promising.

COMPAÑÍA DE COBRE DE ARIZPE.

Office: Hermosillo, Sonora, Mex. H. J. Smi ager. Is incorporated under laws of Mexico. developed property in the district of Arizpe.

COMPAÑÍA MINERA ARMANDO.

Office and mine: Zautla, San Juan de los erty is the Armando mine, ores of which carry small quantities of gold and silver.

ASSOCIATED COPPERS CORPORATION.

Office: Cassville, Oneida Co., N. Y. E. B. Leech, vice-president; John H. Spring, secreta

anager. Capitalization $1,500,000. Lands, 57 claims, area 1,280 acres, Desert Valley Mining district of Yuma County, Arizona.

TIC-PACIFIC COPPER CO. **CALIFORNIA.**

antic City, N. J. Mine office: Smith River, Del Norte Co., Cal. H. F. president. Lands, 14 claims, adjoining the Union mine on the north, nnels of 500′ and 700′. Presumably idle.

ST MINE. **ARIZONA.**

ne office: Patagonia, Santa Cruz Co., Ariz. Wm. Kemp, general man- Mine has a 250′ shaft, said to show ore averaging 17% copper and 7 oz. er ton, and management was said, May, 1909, to have closed a contract ie Old Dominion smelter for shipment of 1,000 tons of ore monthly. 1909, were circa 30 men.

LA CROWN MINING CO. **WASHINGTON.**

ne office: Lucerne, Chelan Co., Wash. Charles Rubin, superintendent. y has gold and copper ores, with water-power and a 2-stamp mill, em- a small force at last accounts.

LA GOLD & COPPER MINING CO. **COLORADO.**

ne office: Russell Gulch, Gilpin Co., Colo. Organized circa June, 1909, aws of Colorado, with capitalization $1,000,000. Property includes the mine, at Russell Gulch, and lands in Clear Creek County, Colorado.

TÉ DES MINES MÉTALIQUES DE L'AVEYRON. **FRANCE.**

ce: 16 Rue du Colysée, Paris, France. Mine office: Sauclières, Mil- eyron, France. M. Mougin, president. Property is lands carrying cop- ver-lead and zinc ores, in the communes of Sauclières and Saint Jean- l, department of Aveyron.

MINES, LTD. **MEXICO.**

ice: 138 Salisbury House, London, E. C., Eng. Mine office: Avino, , San Juan del Rio, Durango, Mex. R. H. Jeffery, general manager. ed circa 1909, under laws of Great Britain, as a reconstruction of Mines of Mexico, Ltd. The old company was not in the best of position ally, and apparently the reconstruction has inherited the monetary debil- the old company.

nds, 250 acres and a 302-acre damsite, 10 miles from a railroad. Mine 800′ shaft and 600′ tunnel, with several large pits, one being nearly width, and of considerably greater length. Property is said to show 2,000,000 metric tons of low grade silicious argentiferous copper ore, e value of ore produced, July and August, 1907, being reported at 36s. 1. Mine is claimed to have produced about $60,000,000 in the past, in silver, but presumably this should be 60,000,000 pesos, equal to about ,000. Property produces a little smelting ore, but ore yielded is mainly entrating grade.

uipment includes a steam plant and a 300-h. p. electric plant, operated rocker-Wheeler gas-engine. A large concentrator first built was found able, and was replaced by a hyposulphite lixiviation plant, which was l to save 85% of the silver and 30% of the gold values. Property was handled, the former management spending too much money on surface, t enough in the mine, in addition to making a serious mistake in the ore treatment. The mine has an immense amount of ore of dangerously erage tenor, but there have been too many changes in local management ocesses, by reason of which no management or process has been given a ial.

MINES CO. **ARIZONA.**

fice: 413 Ft. Dearborn Bldg., Chicago, Ills. Mine office: Prescott, Yava- , Ariz. Perry L. Turner, president; Emil Rautman, secretary, treasurer neral manager; preceding officers, Frank W. Thompson, John Wesley and

James E. Walters, directors. Organized I
capitalization $3,500,000, shares $1 par.

Lands, 7 claims, area circa 100 acres, 5
south of Prescott, near the Hassayampa
Property is said to show 10 fissure veins,
shaft on a 15′ vein. Mine has about 1,800′
said to average $5 to $6 per ton in combine

The company claims to have a copper b
richness, an honest and efficient managemen
shareholder, and the management states, m
the property is destined to excel the Copper
Finn was quoted, by the company, as guara
to pay 20% dividends in one year's time,
that, with a 200-ton smelter, he would ear
averaging $17.50 per ton, and that if this
capacity, he would guarantee to pay divid
shows that Mr. Finn, if correctly quoted, is

AZTEC MINES CO.

Mine office: Central City, Gilpin Co
manager. Property carries auriferous an
equipment includes steam and electric pow

AZTEC MINING CO.

Office: Guadalajara, Mex. Mine offi
Juan D. Isabel, president and general mana
erty includes El Zopilote and La Trinidad
cisco mine, near Carrizo, the former carryi
ing silver-lead ore.

COMPAÑÍA RESTAURADORA DE BACA

Mine office: Tepehuanes, Santiago Pa
is the Candelaria mine, carrying ores of go

MINES DE CUIVRE DE BAILOR.

Office: 70 Rue de Namur, Brussels, B
director. Organized Feb. 14, 1907, under l
f2,000,000, shares f100 par. Property is in

BALAKLALA CENTRAL MINING & SME

Office and mine: Coram, Shasta Co.,
Jos. C. Montgomery, secretary. The Balak
one-third of the capital stock. Lands, 3 p
to be situated in about the middle of the
100′ tunnel, and probably will be operate
mine.

BALFOUR PROSPECTING ASSOCIATION

Office: Melbourne, Australia. Mine
erty, formerly known as Chester's mine, is
a schistose ore channel of 145′ reported w
copper ore ranging from a few inches to
chalcopyrite assaying up to 20% copper. E

BALTIC MINING & SMELTING CO., LT

Office: Wallace, Idaho. Fred Johnson,
tary. Capitalization $150,000, shares 10 ce
ders County, Montana, developed by tunne
of 6′ to 8′ estimated width, carrying aurif
with quartzite gangue, giving assays of 7%
with a trace of gold. Equipment includes

IORE CONSOLIDATED MINING CO. **UTAH.**
e office: Eureka, Juab Co., Utah. Robt. Brown, president; C. C. vice-president; S. M. Simpson, secretary; John Enlund, treasurer. d December, 1908, under laws of Utah, with capitalization $100,000,) cents par. Lands, just north of Big Hill, in the eastern section of the strict, are being developed by shaft.

COPPER CO. **MONTANA.**
e and mine: 401 State Savings Bank Bldg., Butte, Mont. Dr. M. J. anager; P. J. Scott, superintendent. Organized July, 1909. Lands, 13 rea circa 250 acres, 3 claims, known as the Linda, Copper Queen and King, being held under bond and lease, and 10 claims were bought te & Buxton Copper Mining Co. for 150,000 shares. Lands are 15 miles t of Butte, near Buxton switch, on the Oregon Short Line railway, in ills of Fleecer Mountain, in the Summit Mountain district, carrying circa the strike of a vein that was mined, circa 1890, by several shallow or silver-lead values. Country rock is granite, much similar to that , covered by a 1′ to 4′ wash, having a mineralized zone of about one- e width, carrying 4 veins, with a diorite dyke to the northward. Shal- and trenches show continuity of the veins, which are leached at sur- wing a little carbonate ore below commercial tenor.
elopment is by several old and shallow shafts, and by a new 2-com- t upraise shaft on the Linda claim, planned to be sunk to depth of by the Linda tunnel of circa 300′ length, latter showing a wide ledge a mineralized streak along the footwall, showing mainly pyrite, with gentiferous chalcopyrite and occasional carbonate stains, with a highly gangue. Property has yielded ore assaying 14 to 23% copper and 24 r per ton, with small gold values, also galena assaying 11% lead, 24 r and $1 gold per ton.
ipment includes a boiler, engine, hoist and air-compressor, adequate for the shaft to 500′, and the improvements include buildings. Property ed promising.

R CONSOLIDATED MINES CO. **COLORADO.**
e: 107 Boston Bldg., Denver, Colo. Mine office: Idaho Springs, eek Co., Colo. Fred S. Nye, superintendent. Mine carries gold and res, and has steam and air power. Property was under development ccounts.

Y CANYON MINING CO. **UTAH.**
e: Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake h. Frank W. Klett, Geo. Ewing, Valentine Williams, H. Percy Browne C. Godbe, directors. Organized circa June, 1909, under laws of Utah, pitalization $100,000, shares 10 cents par. Lands, 13 claims, in the part of the Bingham district.

WEST COPPER EXTENSION SYNDICATE, LTD. **MEXICO.**
ce: 19a Coleman St., London, E. C., Eng. Mine office: Suaqui de Tres, Sonora, Mex. F. Wadham, A. Baker and H. F. Wadham, directors; arker, secretary. Organized June 11, 1908, under laws of Great Britain, pitalization £25,000, shares £1 par; issued, £21,577. Property was ac- of British Mexican Copper Syndicate, Ltd., which is under practically e management.

R-BUTTE COPPER CO. **UTAH.**
ce and mine: Beaver, Beaver Co., Utah. John M. Murdock, president; F. Fillerup, vice-president; O. F. McShane, secretary and treasurer; ng officers, John D. Pritchett and John E. Pritchett, directors. Or- circa June, 1909, under laws of Utah, with capitalization $50,000, 10 cents par. Lands are in the Newton district.

Office: Spokane, Wash. Mine office: Delta, Shosh
Waldo Murphy, president; D. R. Glasgow, secretary. Capit
shares $1 par. Lands, 3 claims, 1 fractional, near Delta,
3′ to 4′ surface width, in quartzite, carrying silver, lead
Mine has about 500′ of workings.

BENCREE GOLD & COPPER MINES, N. L.

Mine office: Forest Reefs, N. S. W., Australia. B. J
ager. Development is by a 200′ shaft, and apparently the r
for gold rather than copper values.

BENOWRIE COPPER CO.

Dead. Property was the Mary mine. Formerly at Ola

BENOWRIE COPPER MINE, LTD.

Mine office: Olary, South Australia. Lands, 20 miles
carry what apparently is a stratified bed between granite
ing mainly azurite and malachite, mixed with iron oxide a
average grade, carrying from colors to 3 dwts. gold per lo
curring in bunches. Mine has been worked occasionally s
production, 1895-1898, was 241 tons of ore shipped, averagi
production, 1899-1901, was 300 tons of ore, returning bett
Development is by a large open cut, 50′ wide, 250′ long and
a number of shallow pits. Mine was a small producer at

BENT MINE.

Mine office: Orogrande, Otero Co., N. M. Lands, o
miles below the Mescalero Indian Reservation, have been
years, with small ore shipments to El Paso smelter. Eq
small concentrator, planned to be enlarged. Employs abou
considered promising.

BERNOUDY-TURKEY CREEK CO.

Mine office: Paradise, Cochise Co., Ariz. J. H. P. Bo
Hall, vice-president; Norwood Oxford, secretary; Burrell M
Chas. W. Lowell, manager; preceding officers, M. H. McLain
directors. Organized circa 1909, with capitalization $2,000
tion of the Bernoudy, Bernoudy-Wright and Turkey Creek
erty has 60′ and 160′ tunnels, showing a low grade ore bo

asurer; preceding officers, B. L. Rich and Jennie C. Lee, directors. d circa August, 1909, under laws of Utah, with capitalization $100,000,) cents par. Property is in Big Cottonwood Cañon.

PPER MINING & MILLING CO. **ONTARIO.**

e: Peterborough, Ont. Mine office: Cloyne, Addington Co., Ont. mieson, superintendent. Lands show auriferous and argentiferous cop- Equipment includes a steam plant, and property was under develop- th about force of about 20 men, at last accounts.

UR GOLD & COPPER MINING CO. **COLORADO.**

e office: Leadville, Lake Co., Colo. K. L. Fahnestock, lessee.

RN MINING & DEVELOPMENT CO. **WYOMING.**

e office: Depass, Frémont Co., Wyo. Jas. Dickie, president; Walter , manager; preceding officers, J. A. Swanson, H. McCormack, Chas. John M. Hench and W. T. Wallace, directors. Organized circa May, th capitalization $1,500,000. Lands, in the Copper Mountain district, he Williams-Luman mine. Some high grade ore has been shipped to a smelter, and is said to have yielded a profit, notwithstanding very high tation charges.

N COPPER MINING CO. **WYOMING.**

e office: Rambler, Carbon Co., Wyo. John W. Cluff, president; Geo. r, vice-president; John Staburg, secretary and treasurer; Geo. Nelson, endent. Lands, 10 claims, adjoining the Tram group on the north and the edge of the Rambler basin, developed by a 70′ tunnel.

IN COPPER CO. **ARIZONA.**

e: 1 West 34th St., New York, N. Y. Mine office: Tucson, Pima Co., V. H. Sterling, president; Chas. O. DeLisle, vice-president; Samuel G. , secretary and treasurer; preceding officers, Mortimer E. Newcomb, hitney, Leon Stern and D. F. Glidden, directors. E. T. Jones, superin- Wm. A. Farish and J. D. Burgess, consulting engineers. Organized aws of Arizona, with capitalization $1,500,000, shares $1 par, fully Security Registrar & Transfer Co., registrar; Empire Trust Co., transfer Shares are listed on the New York curb.

ds, 12 claims, area 240 acres, known as the Alamo group, and two 40- llsites, adjoining the Pontotoc, in the foothills of the Santa Catalina ins, 7 miles north of Tucson. Mr. Farish says the property is located eat mineralized porphyry dyke, ore occuring in the contact between ie and schist, which, from surface indications, is 300′ to 800′ in width. npany claims that each of its 12 claims show ore in place, apparently ying the same mineralized dyke. Transportation is by a good wagon Tucson. The property has shallow shafts and tunnels aggregating 00′ of workings, showing leached ore carrying stringers assaying 2 to pper, with gold and silver values, and a 2-compartment shaft, started 22, 1909, is planned to be sunk 800′, with crosscuts from bottom. Com- ated in its prospectus that its mine is in the greatest mineral belt in ld, and is in a direct line north and south with such mines as the United Miami, Ray, Copper Queen and Shannon, which is an absolute misstate- f fact, evidencing gross ignorance or a deliberate intention to mislead.

AFT MINING CO. **UTAH.**

ne office: Eureka, Juab Co., Utah. Geo. A. Taylor, president; Walter per, vice-president; Ralph A. Badger, secretary and treasurer; preced- cers, John R. Vance, Wilford Hays and D. W. Craig, directors. Orga- uly, 1909, under laws of Utah, with capitalization $10,000, shares 1 cent roperty is in the North Tintic district.

AM MIDWAY MINING CO. **UTAH.**

ice: Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake

ager; S. S. Badger, consulting engineer. Capitalization $
par. Company absorbed the North Bisbee Development
shares.

Lands are 42 contiguous claims, in Tombstone Cañon,
west of Bisbee, including the Eureka group of 13 claims, ne
taken over from the Eureka Mining Co., and the North
claims, taken over from the North Bisbee Development Co.
to have been done on the property by Mexicans, in early
includes two 50′ shafts and a 360′ tunnel, showing ore givi
copper. Property idle, August, 1909, but resumption planne

BLACK BEAR MINING CO.

Mine office: Telluride, San Miguel Co., Colo. Oscar N
dent. Mine carries auriferous and argentiferous sulphides
zinc. Equipment includes an electric plant, 20-stamp mill
trator. Employs circa 40 men.

BLACK JACK MINING CO.

Mine office: Corbin, Jefferson Co., Mont. H. M. Bro
Lands carry copper and silver ores. Has steam power.

BLACK KETTLE COPPER CO.

Office, Baltimore, Md. Mine office: Sierra Blanca,
Property is in the Quitman Mountains, south of Sierra B
work was begun circa September, 1909.

BLACK MOUNTAIN COPPER CO.

Mine office: Junction, Yavapai Co., Ariz. F. A. Reis
Property was under development with a small force at las

BLACK RIVER COPPER CO.

Mine office: Cherry, Yavapai Co., Ariz. G. M. Batty
to have secured high grade gold ore, at a depth of 70′,
July, 1909.

BLUE BELL MINING & SMELTING CO.

Office and mine: Yucca, Mohave Co., Ariz. Thos. Low
Johnson, vice-president; E. T. Miner, secretary and treasur
Bill Williams Fork River, south of Yucca, slightly dev
siderable ore of good grade, estimated to average about 1

00 grams silver and 3 grams gold per metric ton. Property has a ver available, and management plans installing a concentrator.

A GREENWATER COPPER CO. **CALIFORNIA.**

office: Greenwater, Inyo Co., Cal. Lands, 2 claims, in the Resting istrict, 6 miles east of Willow Creek and about 10 miles west of the & Tidewater railway. Development is by a 70′ tunnel. Property has ein of 12′ to 18′ estimated width, traceable about 3,000′, the outcrop some cerussite, with gold and silver values. Ore lying next to the wall carries gold and lead values, and ore lying next to the limestone ies gold, silver, lead and copper values, mainly in lead, with fair of copper, silver and gold.

A MINING & DEVELOPMENT CO. **CALIFORNIA.**

: Phoenix, Ariz. Mine office: Vontrigger, San Bernardino Co., Cal. Grant, director. Organized October, 1909, under laws of California, talization $500,000.

E MINING & SMELTING CO. **WASHINGTON.**

: Spokane, Wash. Mine office: Newport, Stevens Co., Wash. Cap- a originally was $1,000,000, increased, 1908, to $2,000,000, shares $1 ıds, 180 acres, patented, 6 miles below Newport, on north bank of Pend River. Development includes a shallow shaft and an 800′ tunnel, how a 2′ vein of ore, carrying about 3 oz. silver per ton. Company lding a quarter-mile flume, from the head of Coyote Creek, to secure

& ALTA COPPER CO. **MONTANA.**

: Boston, Mass. Mine office: Corbin, Jefferson Co., Mont. Employs men. John Joyce, president; Marcus L. Hewett, vice-president; Chas. secretary and treasurer. Organized circa July, 1909. Property ap- is the old Alta mine, having a new 2-compartment shaft, planned to sed later to 3-compartments, and planned to be sunk 1,000′. Equip- ludes two 75 h. p. boilers, a 14-drill Rand air-compressor and a 500′ od hoist. Electric power is to be taken from a commercial company ating purposes. Improvements include necessary mine buildings. this company or the Alta-Montana Copper Co. is the present owner of e has not been learned. Is not regarded favorably.

-BISBEE MINING CO. **ARIZONA.**

e: 91 City National Bank Bldg., Utica, N. Y. Mine office: Bisbee, Co., Ariz. Wm. J. Thistlethwaite, president and general manager; t. Harlan, superintendent; Daniel F. Strobel, secretary; J. C. Breen, . Organized March, 1908, under laws of Arizona, with capitalization 0, shares $10 par; issued, $700,000. Utica Trust & Deposit Co., regis- mpany absorbed the Modern Copper Mining Co. Dec. 25, 1908.

ls, 29 claims, 3 fractional, unpatented, area circa 550 acres, at the t end of Tombstone Cañon, in the Warren district, showing 5 fissure rrying carbonate and sulphide ores, of which one vein, slightly devel- claimed to give ore with average assay values of 7% copper, 10% oz. silver and 1 oz. gold per ton. Development includes shafts of 30′ and a short tunnel, latter planned to strike a vein showing a gossan Property is considered poorly located. In May, 1909, company resumption of work, by sinking the shaft 500′ deeper, but apparently was done, and property idle at last accounts.

N-COURTLAND COPPER CO. **ARIZONA.**

e office: Courtland, Cochise Co., Ariz. Weldon C. Humphries, man- Lands, near the railway station at Courtland, were prospected with churn drills, previous to starting a 2-compartment shaft, on the e claim, which was 50′ deep, late September, 1909.

Mine office: Parry Sound, Parry Sound district, Ont.
1908, under laws of Maine, with capitalization $1,000,000, sha
200 acres, in vicinity of the Willcox and McGowan mines.

BOSTON & PIOCHE MINING CO.

Office: Newhouse Bldg., Salt Lake City, Utah. Mine o
coln Co., Nev. C. S. Miller, general manager. Organized
successor of Boston & Pioche Mining & Development Co.
lying east of the Nevada-Utah, including the Fannie and Pe
oped by shafts, both small producers in the past. Presumal

BOUSE-PIOCHE GOLD & COPPER MINING CO.

Mine office: Bouse, Yuma Co., Ariz. Property is th
west of Bouse, from which first shipment, made March, 19
$150 per ton in gold, in addition to fair copper values.

BOWEN COPPER CO.

Mine office: Wendendale, Yuma Co., Ariz. Developn
shaft, and equipment includes power drills. Company wa
carloads of good ore weekly, to El Paso smelter, circa May,

BOWYER GOLD & COPPER CO.

Office: Quartzite, Ariz. Mine office: Bouse, Yuma
McPeak, president; David Watson, vice-president; Jos. Bow
general manager; preceding officers, E. N. Jenkins and J
directors. Organized October, 1909, under laws of Arizona,
$5,000,000, shares $5 par. Lands, 6 claims, known as the S
the western slope of Dome Rock Mountains, about 10 mile
Property has a vein of 60′ estimated width, with schistose
stone footwall, carrying an iron gossan, opened for length
ore, mainly oxidized, assaying up to 7% copper and $2 gold
ment plans development by shaft.

BOYER-NEVADA COPPER CO.

Office: 508 Equitable Bldg., Denver, Colo. Mine office:
Co., Nev. Dr. Franklin R. Carpenter, president; H. R. Durk
Arthur Howe Carpenter, secretary and treasurer. Lands, 2
230′ tunnel. Property shows a leached zone carrying patch
oxidized ores said to give a general average assay of 12.68

Ures, Sonora, Mex. J. C. Pavia, chairman; preceding officer, A. Baker, . Wadham and Capt. M. W. Greite, directors; P. W. Jones, secretary. ed Nov. 30, 1907, under laws of Great Britain, with capitalization in 9,850 shares of £1 par and 3,000 founders shares of 1s par; issued, dinary shares and 2,761 founders shares. Company floated the Batuc opper Extension Syndicate, Ltd., and declared an interim dividend of r annum, October, 1908.

H-YUKON COPPER & SILVER MINING CO. **COLUMBIA.**

d. Lands, 3 claims, on Taku Inlet, were sold December, 1908, by re- for $50. Formerly at Atlin, Atlin district, B. C.

LYN BRIDGE MINING & MILLING CO. **MONTANA.**

e office: Clancey, Jefferson Co., Mont. J. Krueger, president; W. C. vice-president; W. E. Dufresne, secretary and treasurer. Lands, 15 3 patented, at the head of Lump Gulch, about 6 miles from Clancey. s about 2,000′ of development work, half of which is in shafts, deepest quipment includes a 150-h. p. boiler, 1,000′ Lidgerwood hoist and Davis rill.

OLME MINING SYNDICATE, LTD. **ENGLAND.**

ce and mine: The Thorn, Threlkeld, Cumberland, Eng. W. H. Bor- retary; preceding officer, J. W. Pattinson, J. S. Quirk, W. H. Borlase R. J. Hutchinson, J. P., directors. Organized Sept. 17, 1907, under laws t Britain, with capitalization £3,000, shares £1 par, in £1,000 preference 00 ordinary shares; issued, £812 preference and £1,000 ordinary shares, id. Property is lands carrying lead, zinc and copper. Presumably idle.

MINING CO. **MONTANA.**

ce: Wallace, Idaho. Mine office: Saltese, Missoula Co., Mont. Harry manager; James Burns, superintendent. Lands show auriferous and erous copper ore, developed by 2 tunnels, lower, of 900′ length, showing pper ore.

NBAR COPPER MINING SYNDICATE. **AUSTRALIA.**

d. The property, one mile south of the Goodrich mine, had a 120′ nd a little ore was sold to the Goodrich smelter. Formerly at Yeoval, ., Australia.

VISTA MINING CO. **MEXICO.**

ce: Pittsburg, Pa. Mine office: San Francisco del Mezquital, Durango, F. A. Ruttman, general manager. Property is La Buenavista copper d El Patrociño silver-lead mine. Development is mainly by tunnel.

AMP MINING CO. **WYOMING.**

e office: Hazelton, Johnson, Co., Wyo. F. A. Sparhawk, superintendent. how ores giving assay values in copper and gold. Equipment includes steam plant.

ON KING GOLD MINING CO. **COLORADO.**

ce: 19 Wabash Ave., Chicago, Ills. Mine office: Silverton, San Juan lo. Frank E. French, superintendent. Mine carries auriferous and ferous sulphides of lead, zinc and copper. Equipment includes an elec- nt. Company employed circa 15 men at last accounts.

FOREST COPPER & SILVER MINING CO. **MONTANA.**

ne office: Trout Creek, Sanders Co., Mont. J. L. Lee, Sr., president. sident and others were arrested, Sept. 21, 1909, for counterfeiting the States silver coinage.

IER BOY MINING CO. **WASHINGTON.**

ne office: Chesaw, Okanogan Co., Wash. Lands carry auriferous cop- s, slightly developed. Equipment includes a small steam plant.

-ALEX SCOTT COPPER CO. **MONTANA.**

ice: Palladio Bldg., *Duluth, Minn.* Mine office: Butte, Silver Bow Co.,

Lands include the Little Annie and Alex Scott clai
area 20 acres, lying between the Goldsmith and Little
west of Walkerville, is a silver property having old worl
ago, that include a 200′ incline shaft, with some drifti
is supposed to carry the northern branch of the Alice v
ing west, the Little Annie having the northern branch a
Alice company's westernmost claims. Idle some years

Principal property is the Alex. Scott, a fractional cl
adjoining the West Colusa mine of the Boston & Mor
Meaderville. Title to the Alex Scott is good, but there
litigation over apexes of the veins. The Alex Scott ca
strike of 4 veins, developed by a shaft of circa 1,400′ d
partments to depth of 900′, and three compartments
shows a vein carrying an 18″ paystreak of high grade
A vein carrying bornite was cut on the 1,000′ level. De
der way on the 1,000′ and 1,200′ levels, with drifting e
considerable good ore. Some ore was shipped, 1908, by
mont smelter, from the 600′ level, and was said to run
good gold and silver values. The Boston & Montana did
the Alex Scott shaft, for the purpose of reaching the fi
and Colusa mines.

Equipment includes a new Nordberg hoist, capable
from a depth of 3,000′. A boiler-house and compresso
1909, and the shaft has a 300-ton ore-bin.

The Little Annie is of problematical value, but t
small, is a decidedly valuable claim, being located in
triet, and surrounded on three sides by fine mines. T
unmercifully rigged, with results disastrous to the com
in April, 1909.

BUTTE-CARLISLE COPPER CO.

Office: 432 Manhattan Bldg., Duluth Minn. Mine of
Co., Mont. M. A. Ryan, president; Chas. Bergson, vice-p
pel, secretary; Edw. Lynch, treasurer; preceding officer
directors. Organized 1908, with capitalization $1,100,000

veloping an 8′ vein giving ore assaying up to 6% copper and 38 oz. r ton. A small vein on the Mammoth claim has given ore assaying per, 125 oz. silver and $6 gold per ton. Property is said to have, on s, 1,700 tons of low grade ore, worth about $6 per ton. Equipment two 80-h. p. boilers. Idle.

& VERDE GOLD & COPPER CO. **ARIZONA.**

and mine: Jerome, Yavapai Co., Ariz. Organized circa April, 1909, italization $1,500,000, shares $1 par. Lands, 10 claims, near Allen having a 200′ tunnel, said to show a 4′ vein of sulphide copper ore.

MINING & SMELTING CO. **WASHINGTON.**

office: Keller, Ferry Co., Wash. Property carries argentiferous cop- and has steam power. Was under development with a small force at unts.

COPPER CO. **ARIZONA.**

: 708 Lonsdale Bldg., Duluth, Minn. Mine office: Miami, Gila Co., . A. Eaton, president; H. B. Fryberger, vice-president; A. O. Rabideau, ; Geo. H. Mance, treasurer; C. W. Pritchett, consulting engineer; T. lton, superintendent; John L. McIver, foreman; W. H. Hamilton, mas- anic. Employs circa 75 men. Organized August, 1909, under laws of a, with capitalization $5,000,000, shares $5 par. Company was floated ver the property of the Cactus Development Co., and it is probable 500,000 shares of the Cactus Development Co. will be retired by an for an equal number of shares of the Cactus Copper Co., and that ers of the development company will be given prior rights to subscribe sues of treasury stock of the Cactus Copper Co., now planned to be from time to time, as further funds are required for development and t.

s originally were 33 claims, area circa 600 acres, and now are 38 rea circa 750 acres, in process of patenting, on Lower Pinto Creek, in rn part of the Globe district, 4 to 5 miles southwest of Miami. Lands principal groups, held under bonds and leases aggregating $415,000, of 0,000 was paid on organization, leaving $395,000 due on bonds, payable nstallments over a 7-year period, expiring 1916. The Pinto group, 9 held under bond from the Pinto Creek Copper Mining Co., and, in e with agreement, 51% of the stock of the Pinto Creek Copper Min- was delivered, October, 1909, to the Cactus Development Co., in con n of the sinking of the Hamilton shaft to a depth of 500′. Lands also 4 claims, a 15-acre mill site and 100 acres of timber lands, formerly s the McNelly-Crowley group, taken over from the Arizona National o., also various individual claims.

property shows a formation markedly similar to that of the Miami, even better surface showing of iron stains. The property carries an highly altered schist, surrounded by areas of intrusive and extrusive rocks, similar to the holdings of the Miami and Inspiration mines, 4 t, and the schistose areas of the Cactus and Miami district undoubtedly tinuous, at some ancient period, until divided by intrusions of igneous d subsequent erosion. The schist is very old, extensively metamor- nd apparently is of sedimentary origin. The schist is fractured and , affording a basis of subsequent mineralization through forming in- le cracks and crevices, there being an enormous area of coarsely bree- hist, well suited for the circulation of mineral-bearing solutions and the n of ores. The property has 150 to 200 acres of schist area exposed, schist underlies a considerably larger area, the exposed area of schist heavy iron blossoms, with occasional copper stains from disseminated

hand until the installation of an air-compressor, Augu
was sunk in remarkably short time. In the Hamilton
evidence to a depth of about 210′, succeeded by carbo
may prove workable, though the lower grade carbona
process of wet concentration, necessary in treating l
Primary sulphides were encountered at depth of 275′, a
the shaft penetrated highly altered schist, showing co
many seams of chalcocite up to an inch or more in thic
of the schist. At 385′, the shaft entered a fault-zone,
strong seepage of water. Below this point the shaft s
commercial tenor, which was expected, as the shaft w
ently was the southern boundary of the payable ore.

Laterals are being opened from the Hamilton shaf
500′ levels, but it is difficult to term these either cros
reason that the ore occurs in the country-rock itself,
found to underly scores and possibly hundreds of acre
northward, on the 3 levels of the Hamilton shaft, may
present, for the reason that they are driving toward an
Owing to the fault which throws the formation to the n
cuts must go increasing distances, with depth, to reach
The 300′ level of the Hamilton shaft is the first to b
rock not carrying commercial values at a point where
have to be opened. The eastern drift on the 300′ level p
of high grade carbonate ore, which could be smelted to
mine, as a whole, is planned to work the disseminated
centration will not permit the saving of low grade oxid
duction necessarily to sulphide ores, and to such of the
ores as can be smelted direct, without concentration.

On Nov. 15, 1909, five crosscuts on the 300′ level
seminated chalcocite of payable tenor, assaying up to
probably is above the average that may be expected thro
same time 2 crosscuts on the 400′ level were breasted
sulphide ore, while the drifts on the 500′ level had not y
zone. Development is by 6 drifts, at 200′ intervals, 3 on
on all 3 levels. Ore development is to be in blocks of 20
100′ in depth, giving block contents of 4,000,000 cubic fe

uipment includes three 100-h. p. boilers and a 12x14" double-drum second-
Mine & Smelter Supply hoist at the Hamilton shaft, and a single drum
t the Pinto shaft, a steam-line running from the Hamilton to the Pinto
Buildings include necessary mine structures and a number of dwellings
oins for workmen. A 3-mile wagon road connects the property with the
oad at the Live Oak mine.

is planned to operate the mine on a modification of the caving and mill-
tem. As developed the Cactus ores should run from 500,000 to 1,000,000
r acre of area, in the workable zone, and it is impossible to predict the
workable ore, though the property has excellent prospects of finding ore
t least 150 acres, judging from surface conditions, with chance of finding
ore in the schist where overlaid by other rocks. Assays secured have
from 0.2% copper, from dense country-rock, up to 40% from small
of rich ore. While some of the drift crosscuts on the 300' and 400'
are breasted in 4% sulphide ore, it would be much safer to estimate the
e tenor of ore to be developed as materially lower, and if the average is
o that of the Miami, 2.75%, which seems reasonable to infer, the Cactus
make one of the largest copper mines of the world. As yet the mine has
tle ore blocked out, but excellent progress has been made in a year, and
occurrence and system of mining are such that, beginning with 1910, ore
be blocked out rapidly. Management is excellent and the property is
very exceptional promise.

VERAS COPPER CO. **CALIFORNIA.**

lice: care of Mines Vending Co., Postal Telegraph Bldg., Chicago, Ills.
office: Copperopolis, Calaveras Co., Cal. Organized circa September,
nder laws of Delaware, with capitalization $5,000,000, shares $1 par.
ny is said to plan a 5-year bond issue of $450,000, at 6%.

nds, 1,700 acres, including the Union, Keystone and Empire mines, also
ns adjoining the Alto, in Del Norte County, California. Property was
, 1909, of Union Copper Mining Co. Mines, opened 1861, were consider-
roducers, paying fair dividends, circa 1861-1866. Formation is a black
is slate, in amphibolite schists, this belt running from Tuolumne County,
south, through Calaveras into Amador County, on the north. The slate
to 40' wide, with strike of 30° East of South, and dip of 30° East. Ore
as lenses of 15' average width, connected by stringers, main lense being
0' wide and 600' long. The alteration zone, circa 30' in depth only, car-
ich oxides and carbonates, and some native copper, below which occurs
pyrite, carrying neither gold nor silver, and unusually free from arsenic,
ony, bismuth and other undesirable elements, blister copper therefrom
g good wire-bars, without electrolytic refining. Product is classified as
ng ore of 10 to 11% copper tenor, and as leaching ore carrying 5 to 5.5%
r.

Main shaft, 60', is bottomed in a 15' lense of medium-grade ore, and the
has a mile of openings in ore. Equipment includes a hoist and pumps,
necessary mine buildings. There is a 100-ton Orford smelter, installed
Operations were confined, for many years, to producing cement copper
aching the old dumps, which are extensive. The old workings were
ed out and retimbered, a 90' steel gallows-frame built over the main shaft,
he smelter overhauled, 1905-1906. A survey has been made for a 12-mile
ay, to connect with the Southern Pacific, at Milton. Mine was closed
, June, 1907, and remained idle till taken over by present company.

CITE COPPER CO. **ARIZONA.**

Mine office: Vicksburg, Yuma Co., Ariz.. Thomas H. Finnegan, manager.
nized circa 1908. Property is said to have been bonded for $300,000,
, 1909, to George Kislingbury and George A. Lonsbery, of Los Angeles.

Lands, 14 claims, 2 miles from a railroad, 5 m
Cañon, between Granite wash and the south
in the northern part of Yuma County. Pr
quartz and iron sulphides 600′ wide and 6,0
and a porphyry hanging, ores of low average
occurring in quartz-schist underlying limesto
phides being disseminated through the coun
W. Mudd states that the interesting portion
try, more or less shaly in places, and highly
clear that at depth the limestone mass sho
pregnated with sulphides, disseminated in g
impregnation is very general, but is accompa
in large streaks or masses, and is unlike t
The limestone mass is broken and twisted,
trusives. Mr. Mudd states positively that th
zation.

Development is by 2 pits and by shaft
80′ through calcite and iron sulphide carry
below 80′, by copper sulphide. A crosscut
Property considered promising.

CALHOUN TUNNEL & MINING CO.

Office: 719 Equitable Bldg., Denver, C
Gilpin Co., Colo. Herbert C. Eastman, manag
nel, showing auriferous and argentiferous co
small steam plant.

CALIFORNIA MINERAL LAND CO.

Mine office: East Auburn, Placer Co., C
show auriferous and argentiferous copper o
counts.

CALIFORNIA MINING CO., S. A.

Mine office: León, Guanajuato, Mex. C
of Mexico, with capitalization 25,000 pesos. I
mines, carrying copper and silver ores. Pres

CALIFORNIA & PARADISE MINING CO.

Mine office: Paradise, Cochise Co., Ariz.
capitalization $500,000, shares $5 par, to take

CALLINGTON DEVELOPMENT SYNDICA

Dead. Was organized July 3, 1907, unde
dated Aug. 8, 1908. Formerly at Callington,

CALUMET-CORBIN MINING CO.

Office: First National Bank Bldg., Laur
Jefferson Co., Mont. Employs about 50 me
dent; John A. Macauley, vice-president; M
Paton, treasurer; preceding officers, Frank H
Reynolds, C. E. L. Thomas, and Charles D.
superintendent. Organized December, 1908,
talization $1,500,000, shares $1 par. Lands
balance of $83,000 due in 6 equal installmen
from Oct. 1, 1909, vendors getting 25,000 sha

Lands, 16 acres, patented, known as th
millsite adjoining the mine, on Clancey Cre
concentrate second-class ore. The Minnesot
1869, is said to have produced $270,000 wort
Minnesota were 2 tunnels and a 275′ shaft,
275′, with a 230′ winze. The old workings a

t is by a 260′ two-compartment shaft, near the mouth of the lower ving silver-lead ore at depth of 200′. Ore formerly mined carried r-lead values, with considerable gold and a little copper, occurring ilized fissure up to 100′ in width, between granite and porphyry nelter test, September, 1909, gave returns of $22 per ton.
ent includes a 40-h. p. boiler and hoist good for 1,000′ depth. Build- a smithy and bunkhouse.

GOLD & COPPER CO. **AUSTRALIA.**

fice: Millthorpe, N. S. W., Australia. John Mills, mine manager. acres, near the Cadia mine, carrying a vein with northwest- rike. Development is by 2 shafts, deepest 121′, on a vein of about arrying a 3′ paystreak assaying up to 16% copper, 10 oz. silver and r long ton. A general sample of the ore at bottom of main shaft ay of 12.1% copper, 5 oz. 4 dwts. silver and 1 oz. 5 dwts. gold per Several parcels of ore shipped returned about £20 per ton net. ncludes a hoist. Property considered promising.

IÓN MINERA LA CAMPECHANA ó **MEXICO.**
VA y ANEXAS, S. A.

ffice. León, Guanajuato, Mex. Organized Jan. 12, 1907, under xico, with capitalization 300,000 pesos. Property is La Cam- nexas mines, carrying lead and copper ores.

. MINERA CAMPECHANA, **MEXICO.**
VIRATO y ANEXAS.

fice: León, Guanajuato, Mex. Lands, 17 kilometers northeast of low grade lead and copper ores, with fair silver values. Equipment oncentrator of 40 metric tons daily capacity, completed 1908, and are shipped to the San Luis Potosí smelter.

TICKEL CO. **ONTARIO.**

Lands sold, 1906, to Ontario Nickel Co. Formerly at Worthington, t.

QUEEN COPPER MINING CO. **MEXICO.**

919-607 South Main St., Los Angeles, Cal. Mine office: La izpe, Sonora, Mex. Presumably idle.

CANTÚ. **MEXICO.**

nd mine: Mazapil, Zacatecas, Mex. Property is the Escalón mine, ares, carrying ores of copper, lead, gold and silver.

IDING MINING CO. **UTAH.**

Payson, Utah. Mine office: Eureka, Juab Co., Utah. Henry lent; O. H. Pulver, vice-president; J. S. Bills, Jr., secretary and treas- ling officers, Marcellus Smith, J. S. Bills, Sr., George M. Sullivan se, directors. Organized circa May, 1909, under laws of Utah, with n $50,000, shares 5 cents par.

ARDONA. **MEXICO.**

nd mine: Veta Grande, Zacatecas, Mex. Property is El Refugio ng lead, copper, gold and silver ores. Equipment includes a small

ON'S LION & 2 EAST GOLD & COPPER CO. **AUSTRALIA.**

fice: Charters Towers, Queensland, Australia. Development is by , showing a 30″ vein of ore carrying good average values in copper Property has a small smelter with one reverberatory furnace for November, 1908, mine shipped 8 tons 13 cwts. of copper matte to mbla electrolytic works, assaying 57.8% copper, 10 oz. 15 dwts. sil- vts. 16 grains gold per long ton.

CASTLE COPPER CO.

Mine office: Prescott, Yavapai Co., Ariz. Organi 1909. Lands, 11 claims, known as the Dunkirk or Mt. miles south of Prescott, on the southern slope of Mt. Tr Slate Creek, in the Hassayampa district, formerly owne Silver Mining Co., and later by Mt. Tritle Copper Co. Pr once worked for gold, having tunnels of 150', 160', 17(vertical intervals of 100', showing auriferous and argentif sulphides, carrying values in copper, gold, silver and le named. A contract has been let for extending the lower t

Equipment includes steam and gasoline power, an electric light plant. A 30-ton mill has 4 Nissen stamps, 3 ton ore bin and a 10,000-gallon water tank. Property wa about 200 tons of ore monthly, at last accounts.

CASTLE DOME METALS CO.

Office: Cincinnati, Ohio. Mine office: Deming, L Allison, president; B. M. Ricketts, vice-president; Loui Hedburg, manager. Lands, 12 claims, slightly develope ore giving good assay values in copper and silver.

SOCIEDAD MINERA CATALANA-VALENCIANA.

Office: 4 Calle de Gerona, Barcelona, Spain. Mine tellón de la Plana, Spain. Domingo H. Santías, general circa July, 1909, under laws of Spain, with capitaliza shares 500 pesetas par. Property is the Maria and Vir cinnabar and copper ores.

CAVERN GOLD MINING CO.

Mine office: Kelly, Socorro Co., N. M. B. A. Statz, carries auriferous and argentiferous sulphides of coppe values apparently being mainly in zinc. Improvements centrator.

CERRO AZUL MINING CO.

Mine office: Ímuris, Magdalena, Sonora, Mex. Prope mine, carrying auriferous and argentiferous copper ore.

hares 100 francs par. The management wishes to install a hydraulic ant and smelter at the property, which is in the Russian Caucasus.

ION COPPER CO. **NEW MEXICO.**

e: 22 Congress Sq., Boston, Mass. Mine office: Embudo, Rio Arriba M. Samuel Littlefield, president; Arthur M. Gripps, vice-president; A. Maloney, treasurer. Organized under laws of Maine, with capitali- 2,000,000, shares $1 par. Federal Trust Co., Boston, transfer agent. claims, patented, area 100 acres, also four 5-acre millsites and a 40- ter-right, on Copper Hill, in the Copper Mountain district of Taos 9 miles east of Embudo, the nearest railroad station, and 25 miles t of Taos. Property is said to have 8 practically parallel veins, of 18" idth, between a schist footwall and quartzite hanging wall, carrying malachite, and chrysocolla, succeeded at depth by chalcocite and gray ore all argentiferous and auriferous, with chalcopyrite beginning to lower workings, all with quartz gangue. Development includes a small of work in shallow shafts and surface-cuts on several claims, a 145' nk on a 4' vein in the Oxide mine, and a 300' tunnel, property as a aving 1,800' of workings. Equipment includes a Leyner air-compressor, nill, which is 50x100' in size, with a 20x30' power-house adjoining. A rface-tram leads from the mouth of the Champion tunnel to ore-bins. ments include a 15,300' gravity pipe-line, of 7" spiral steel-riveted

PION COPPER MINING CO. **NEW ZEALAND.**

id. Was succeeded, circa 1907, by Maoriland Copper Co., Ltd. Formerly on, N. Z.

GO & ARIZONA COPPER CO. **ARIZONA.**

ce and mine: Willcox, Cochise Co., Ariz. John H. Crowley, president; oto, secretary. Lands, 9 claims, in the Dos Cabezos district, carrying us and argentiferous copper ore. Company planned development, at counts.

CONSOLIDATED MINING CO. **UTAH.**

ice: Houghton, Mich. Mine office: Eureka, Juab Co., Utah. Walter president and general manager; Frederick W. Denton, first vice-presi- ohn R. Van Evera, second vice-president; William P. Seager, secretary easurer; preceding officers, J. H. Rice, Murray M. Duncan and A. B. directors; Cecil A. Fitch, superintendent; Walter Fitch, Jr., engineer. zed Feb. 16, 1909, under laws of Arizona, with capitalization $1,000,000, $1 par; issued, $810,000, Houghton National Bank, registrar. Of the ization, $500,000 went to the American Mines Syndicate for lands, and shares were issued at par. Shares are listed on the Boston Curb. meeting, third Tuesday in February. Is controlled, through half owner- y American Mines Syndicate, and controls, through majority stock owner- he Eureka City Mining Co., organized to secure mineral rights under the te of Eureka. Is absorbing the Little Chief Mining Co. through exchange share of Chief Consolidated for 3 shares of Little Chief.

nds, circa 400 acres, including 11 claims controlled directly, and through ship of shares in Eureka City Mining Co. and Little Chief Mining Co. claims are patented, with no adverses on balance. Property includes old gs of the Little Chief, 3 claims owned outright and 5 claims held under),000 bond and lease, also the Granite claim, bought for $30,000, and an ded half-interest in the American Star and Blackbird claims, bought for 0, the other half-interest in latter claims being owned by the Tintic Co. Property is the largest in the Tintic district, and is well located, ing the Eagle & Blue Bell on the north and east.

he property carries about 4,000' of the strike of the Victoria ore channel,

1,800′, and drift from the bottom to the territory under the trolled through the Eureka City Mining Co.

Equipment includes a 200-h. p. steam plant, with a ge hoist good for 1,700′ depth, and a 10-drill air-compressor. boiler and engine-house, assay office and sorting and shippin

Ore was discovered March, 1909, and to Oct. 31, 1909, tons, derived exclusively from development work. Of this was silver-lead ore, yielding a profit, after deducting all ton, balance of shipments consisting of silver ore that $4.350 above all expenses. This showing by a purely devel most unusual, and highly satisfactory. Management is exc considered exceptionally promising.

JUAN K. CHILD y CA.

Dead. Was succeeded, 1905, by J. K. Child & Co., Ltd Coro, La Paz, Bolivia.

CHINESE MINING EXPLORATION CO.

Mine and smelter office: Chang-Sha, Ho-Nan, China general manager. Is owned and managed by the governme present, is on lead ore, but the property includes promisi which it is planned to develop later.

CHINO COPPER CO.

Office: 87 Milk St., Boston, Mass. Mine office: San N. M. Charles M. NacNeill, president; Daniel C. Jacklin A. Chester, Beatty, consulting engineer; preceding officers and Col. Charles Hayden, executive committee; preceding o rose, W. Hinkle Smith, J. G. Hopkins, Henry M. Whitne Foss, Berthold Hochschild and Samuel Sloan, directors; E. I Keith Stewart, treasurer; Kurnal R. Babbitt, general coun superintendent. Organized circa August, 1909, under la capitalization $3,500,000, shares $5 par. Charter contains 2 years company must not increase its capitalization, incu nor have other liabilities in excess of $1,000,000. Company of the capital stock of the Santa Rita Mining Co. Of 425,000 shares were outstanding and 275,000 shares in the t 1909. Company began business with $250,000 in cash. Is c management and ownership, with the Utah Copper Co., Ra

g country rocks of two types, one being a quartz-diorite and the other
le-porphyry. Diorite forms practically all of the rim of the basin on the
orth and west, dipping in a generally southeastern direction, under the
ve flows which constitute the south and southeast rims. The sedi-
ies consist of a quartzite bed overlying a series of impure limestones.
desite-porphyry is a later intrusion than the diorite, cutting both diorite
he sedimentaries, and the ore bodies are associated with andesite-
ry, both intrusives and sedimentaries having been much shattered, giving
onditions for secondary enrichment. The old workings, very irregular
racter, have developed considerable high grade ore, and include No. 8
with two compartments, 214' deep, carrying stopes on 8 drifts, No. 9, a
mpartment shaft, started 1906, also No. 10, started 1907. Plans of the
t management are much more ambitious than those of the former owners,
ll for the development of an enormous quantity of low grade country-
re, which apparently occurs in a crescent-shaped belt some 7,000' in
, the property showing about 250 acres of lands that apparently should
low grade ore bodies available for development. The property is being
by 8 churn drills, boring holes at 100' intervals, checkerboard fashion.
rst 100 holes were drilled to an average depth of 263', and, of this num-
holes penetrated ore, and 21 were drilled in ore below commercial tenor,
ing developed at an average depth of 167'. The property has been divided
main ore zones, of which the Romero, Montoyo and Chino zones are ex-
to be mined opencast, by steam shovel, while the Hearst, Texas Flat
Thim Hill ore bodies are expected to be mined by the caving system,
ive of the Texas Flat section, where the ore lies very deep, early drilling
d a barren capping averaging 60' in depth, succeeded by an average of
ore. The company is developing 1,000,000 to 1,500,000 tons of ore
ly, and has about 10,000,000 tons of ore proven, estimated to average
2.5% copper. The property shows a great variety of ores, ranging from
copper to low grade sulphides, latter being expected to develop the
pal ore values, but, judging from past and present development, there
be a considerable amount of high grade ore, which will serve as a
ner for the low grade disseminated ores, and the old dumps contain
150,000 tons of ore, of about 2% estimated average copper tenor, hereto-
nworkable, but which easily can be milled at a profit with a large modern
ntrator specially planned for the treatment of low grade disseminated sul-
s.

Equipment includes a 125-ton concentrator and sampling mill, built by
s, and a test of the disseminated ore made by the present management
a concentration of about 12½ into 1, with recovery of 90 to 95% of
values, or 24 lbs. fine copper per ton, and, judging from tests in the
imental mill, a concentrator built especially to treat this ore should make
ction of about 70%. Management is said to plan using the underflow
ater along Lone Mountain draw for milling purposes. Estimated cost of
ed copper is about 9 cents per lb. The property is exceptionally promis-
and is in the hands of the capable men who have been the pioneers in the
essful development of low grade country-rock copper mines.

[illegible] & GLOBE MINING CO. ARIZONA.

Mine office: Globe, Gila Co., Ariz. [illegible] Chrisman, manager. Lands: [illegible]
s, located one-half mile northeast of the Arizona & Michigan and one-half
east of the Superior & Globe properties.

[illegible] MINING CO. NORWAY.

Office: Christiania, Norway. Mine office: Kongsberg, Norway. [illegible]
n copper ore lands in Kongsberg and at Kotsmark, Norway.

Office: Grosse Bldg., Los Angeles, Cal. Mine off
Mex. J. Ross Clark, president; Lester F. Scott, secretar
promoted by Patrick Clark, J. Ross Clark, H. L. Percy, F
Harvey and F. M. Lawrence. Organized circa 1906, to
water district, and still holds the Morning Glory group,
which showed a fine body of carbonate ore, running
tenor, but which cut out on the 80′ level. Of the 800
issued, 600,000 shares were divided among the incorporato
were sold at 50 cents each, giving $100,000 raised throu
was divided between the promoters and the treasury, latte
Company was reorganized, 1908, at which time, after a ho
the promoters and shareholders, the incorporators paid
treasury, and returned 400,000 shares of promotion stock.
an option on the Promotorio mine, from the Alamos Cop
put some miners at work, to the great benefit of the mark
but option on Mexican lands was forfeited, Sept. 1, 19
apparently consists of $18,000 cash and 400,000 shares o
company is said to have turned its eyes longingly in the
oil lands.

CLIFTON-MORENCI COPPER CO.

Office: Calumet, Mich. Mine office: Morenci, Graha
J. Smith, president; F. H. Haller, vice-president; W. J.
Edward F. Cuddihy, treasurer; preceding officers, Theo.
burn, George J. Maas, Martin Voetsch, M. J. Harringto
E. McCormick, directors. Organized, 1909, under laws o
talization $1,000,000, shares $5 par. Company gave 40,0
purchase price of the property, and offered, Nov. 22, 19
public subscription at $1 per share. Lands, 150 acres, unp
and lease, in the Copper Mountain district, 2 miles from
Morenci and 8 miles from Clifton. Development includes
for 350′, with winzes of 10′, 33′ and 119′, said to be botto
16.2% copper and 7.3 oz. silver per ton. From the botto
28′ crosscut to the hanging-wall showed an ore chute of
width, carrying ore assaying 14% copper and 7 oz. silve
crosscut being in ledge matter assaying 0.5% to 1.25% co
building a 4-mile aërial tram from the mines to Morenci,

Ltd. Present property is a railroad, under construction, from Mount
o Cloncurry, via Hampden. A smelter is planned to be erected later.

RRY SURPRISE COPPER & D MINING SYNDICATE. AUSTRALIA.

e: Brisbane, Queensland, Australia. Mine office: Cloncurry, Beacons-
Queensland, Australia. Property was under exemption from labor
s, August, 1909, and the British Wonder lease has been let on tribute.

LADSTONE MINING CO. AUSTRALIA.

office: Cobar, Robinson Co., N. S. W., Australia. Main shaft is 195'
ine produced, late 1908, about 10 tons of high grade ore, assaying about
per after dressing. Company has secured ore giving some colors of

THARSIS CO., N. L. AUSTRALIA.

office: Cobar, Robinson Co., N. S. W., Australia. Property, about
north of Cobar, apparently has the continuation of the ore body of
Bourke mine of the Cobar Gold Mines, and the East Cobar lode.
formerly was known as the Ivanhoe and also as the East Cobar
line Extended. Development is by a 350' shaft, showing a little low
cious ore, below commercial tenor. Work was suspended November,

LA COPPER CO. ARIZONA.

office: Salome, Yuma Co., Ariz. Col. J. W. Sharpe, manager; R. V.
perintendent. Lands, known as the Ultimatum group, in Tank Pass,
the Alvin Development Co., and several miles east of Yuma Copper
he Harcuvar Mountains, 9 miles northwest of Salome, carry about
the strike of various ore bodies. Property has a series of diabase
ting limestone, showing ore carrying chalcocite, bornite and chalcopy-
limestone and diabase gangue, values being mainly in bornite and
ite, averaging 3 to 5% copper, 5 to 6 oz. silver and $1 to $8 gold per
occasional streaks and masses of high grade ore. Mine has a 100'
a 200' tunnel. Property considered promising.

ÍA MINERA EL COBRE. MEXICO.

: Calle de Santa Teresa 6, Mexico, D. F. Mine office: Jungpeo,
Michoacán, Mex. Alfred Stoffel, president; M. Herrle, secretary;
Armour, treasurer. Organized March 7, 1907, under laws of Mexico,
talization 95,000 pesos. Property is El Cobre y Anexas mines, carry-
silver and copper ores.

RN MINE. SOUTH AUSTRALIA.

office: Cockburn, South Australia. Lands, 2 miles west of the
mine, have a nearly north and south vein, dipping vertically to the
ying chalcopyrite. Mine is being developed by shafts.

'ALENE-MONTANA MINING CO. MONTANA.

office: Trout Creek, Sanders Co., Mont. A. G. Somes, president.
tion $500,000, shares 50 cents par. Lands, 8 claims and a millsite,
uthwest of the Northern Pacific railroad at Trout Creek, on the Idaho-
divide. Development is by a 900' tunnel, showing a vein of 30' esti-
dth, carrying assay values in copper, lead and silver. Equipment
2-drill air-compressor.

TER GOLD & COPPER MINING & MILLING CO. COLORADO.

: Colchester, Ills. Mine office: Salida, Chaffee Co., Colo. M. E.
esident; T. T. Foster, vice-president; George Sullivan, secretary;
ar, treasurer; Thomas Penrose, general manager; preceding officers
irectors. Organized May, 1908, under laws of Colorado, with capi-
$500,000, shares $1 par. Lands, 4 claims and a tunnelsite, un-
area 200 acres, on Cleora Mountain, northeast of Salida. Develop-

ment includes a 40′ incline shaft and a 1
owners, also new tunnels of 55′ and 110′.
of $10 to $63 per ton in gross values from c

COLE DEVELOPMENT CO.

Office and mine: Globe, Gila Co., Ariz.
Jr., secretary and treasurer. Organized Se
zona, with capitalization $300,000, shares $1
the Cole & Goodwin group, in a tract 4 clai
along Mineral creek, 3 miles from the Gib
of Globe, the nearest available railroad poi
Country rock is Pinal schist, carrying a fa
that cuts the schist diagonally, and is trace
old 320′ incline shaft, equal to 220′ vertica
grade copper ore and several bodies of conc
bornite and chalcopyrite. Work of deepeni
1909, and shaft was 335′ deep Oct. 24, 19
the shaft, estimated to average 8 to 10% c
countered at depth of 265′. Property also
schist impregnated with pyritic sulphide ore
about one-half mile from the shaft, and a
the shaft, with portal 500′ vertically below t
includes a 22-h. p. gasoline hoist.

COLLIER CREEK COPPER CO.

Mine office: Gold Beach, Curry Co., C
Property, showing auriferous and argentifer
ment with a small force at last accounts.

COMPAÑÍA MINERA DE COLÓN y LIBE

Office: Mexico, D. F. Mine office: Z
Organized Jan. 5, 1898, under laws of Méxic
Property is the Cristobal Colón and La Lib
copper and silver values.

COLORADO RIVER COPPER & GOLD MIN

Mine office: Las Vegas, Lincoln Co., Ne
2 short tunnels, showing ore giving good ass

COLUMBIA-BUTTE MINING & MILLING

Mine office: Whitehall, Jefferson Co.,
Lands, 5 claims, about 5 miles from Whiteh
to the Butte Reduction Works. Apparently
regarding titles to some of its lands.

COLUMBUS COPPER MINING CO.

Dead. Formerly at Bingham Canyon, Sa

COMBINATION GOLD & COPPER CO.

Office: Carson City, Nev. Mine office:
Davis, managing director. Lands, 14 claims,
miles from Copper City, having about 50′ of

COMPAÑÍA MINERA LA CONCEPCIÓN

Office and mine: Catorce, San Luis Poto
Mexico, with capitalization 300,000 pesos, sh
ore carrying values in copper, lead and silve

CONCONULLY COPPER CO.

Mine office: Conconully, Okanogan Co
Wellington mine, show a vein traceable for
pany's claims, giving ore assaying well in co
200′ tunnel and December, 1908, managem

and getting out ore for immediate shipment to the Granby smelter, but ntly failed to make such shipments.

AGNIE MINIÈRE DU CONGO FRANÇAIS. **FRENCH CONGO.**

ice: 182 Avenue de Saxe, Lyons, France. Mine office: Ramanga, French G. Linière, G. Planche, F. Planche and E. Rampon, directors; M. F. ux, commissaire. Organized June 20, 1905, under laws of France, with lization 1,000,000 francs, shares 500 francs par.

roperty, known as the Mindouli mine, is in the Bouenza district, in the u-Niari basin, circa 300 kilometers from the coast. Lands show cuprif- sandstone, overlying limestone, surface ores being mainly malachite, ome cuprite, both argentiferous. These deposits were worked by natives, rimitive way, for centuries, and a considerable trade once existed in and copper utensils, but this became extinct with French occupation. ently the ore deposits are extensive, but it is doubtful if the mine is ble, under modern conditions, without railroad transportation, now lack

OLIDATED EUREKA MINING & TUNNEL CO. **COLORADO.**

ine office: Eureka, San Juan Co., Colo. L. F. Stead, superintendent. carries copper and lead ores. Equipment includes a small Leyner air- essor.

OLIDATED GOLD & COPPER QUEEN MINING CO. **WASHINGTON.**

ffice: 613 Pioneer Blk., Seattle, Wash. Mine office: Mayfield, Lewis Co., W. H. Springfield, president; George Estes, vice-president; J. S. Mc- e, treasurer. Capitalization $1,250,000, shares $2.50 par. Lands, 9 claims, g open cuts on a dyke of 40′ estimated width, showing ore giving average s of about $8 per ton in gold.

STITUTION MINE. **CALIFORNIA.**

ffice and mine: Campo Seco, Calaveras Co., Cal. C. Borger, owner. Lands, ms, also mineral rights to sundry adjoining property. Development is by ′ shaft, on the Constitution claim, showing patches of good ore, also a aft showing a 4′ vein of ore similar to that of the Penn Chemical Com- 's mine, assaying 15% copper, with small values in silver and gold.

TINENTAL MINES, POWER & REDUCTION CO. **COLORADO.**

Office: P. O. Box 1374, Denver, Colo. Mine office: Yankee, Clear Creek Colo. Henry I. Seeman, president and general manager; Frank R. Baker, president; William H. Warinner, secretary. Organized Nov. 7, 1905, under of Colorado, with capitalization $5,000,000, shares $1 par; issued, $4,000,000. any reported, Aug. 31, 1908, having $24,531.17 cash on hand, without ed liabilities.

Lands, 171 claims, area upwards of 2,000 acres, partly patented, also about acres in mill and smelter sites, in the Lincoln district. Country rocks are s, schist and granite, with porphyry dykes, carrying fissure veins with tzite gangue, property showing about 75 veins, with reported width of 3′ 0′, said to be traceable 4 miles. Ores, which are sulphide, are reported by any to average 2 to 14% copper, 5 to 40% lead, 1 to 3% zinc, 1 to 3 oz. and $5 to $500 gold per ton. Development is by shafts of 200′, 235′ 175′, with numerous shallow shafts, and by numerous tunnels of 100′ and rds, three longest being 800′, 1,500′ and 2,200′, latter, known as the Seeman cut tunnel, 8x8′ in size, being planned to give a 5,000′ back. The mine bout 3 miles of workings, estimated to show 500,000 tons of ore blocked

Equipment includes a 25-h. p. hoist, 6-drill Sullivan air-compressor, air and ric drills. Buildings include a 30x50′ machine shop, hotel, 3 boarding s and 12 dwellings. The mill, 50x150′, of wood, with iron roof and siding, tons daily capacity, has 12 quick-drop gravity stamps, one Blake crusher,

COPPERSMITH MINING & MILLING CO.

Office: 107 Second St., Moscow, Idaho. Mine office: Co., Mont. F. W. E. Schmitz, president and general m Merwin, secretary; Benton S. Merwin, assistant secretary; mine superintendent. Organized January, 1909, with capit shares $1 par.

Lands, 8 claims, unpatented, area 160 acres, in 2 group smith group of 6 claims and the Inverness group of 2 claim and millsite, about 6 miles up Petty creek from Lothrop. P good timber. The Coppersmith claim is said to have b and located by John C. Frémont, then a lieutenant in the re to the American Civil War. Property shows 3 main veins, over 100′ wide at outcrop and traceable 1,200′, giving ore copper. The Exty vein, 500′ from and parallel with the Cop as 15′ wide, and the Inverness vein, about 4′ wide, in sla high grade copper ore with talcose gangue. Development cuts, prospect holes and 2 tunnels, lower reported by compa be 67′ long, in ore below commercial grade, but ore ex gets under the iron capping, circa 300′ further.

COPPER WORLD MINING CO.

Mine office: Jerome, Yavapai Co., Ariz. Property was with a small force, at last accounts.

CORBIN-CLANCEY CREEK MINING CO.

Office: Butte, Mont. Mine office: Corbin, Jefferson Gensberger, manager; Capt. W. C. Hosking, superintende June, 1909, under laws of Montana, with capitalization $10 Lands, 2 claims, on Gregory Gulch, west of and adjoining Development is by an old 700′ tunnel, and management p tunnel on the Minnesota vein.

CORBIN COPPER CO.

Office: 60 Congress St., Boston, Mass. Mine office: C Mont. Employs circa 50 men. Stephen R. Dow, presiden wards, general manager; Alvin R. Bailey, secretary and t officers, George E. Learnard, Noah W. Jordan and David Quinn Crowley, superintendent. Organized January, 1909, u gan, with capitalization $3,750,000, shares $25 par. Ann

are reported to carry 10 different leads, including the north lead, out-
ng for circa 3 miles on the company's property. Property shows a sys-
5 parallel leads in a cross-section of 600′ to 800′, with practically east
est strike, estimated to average about 20′ each in width, crossed by a
al vein, with an intrusive rhyolite 1,000′ to 2,000′ wide.
evelopment includes a shallow shaft, left by former owners, but new work
tunnels. Main tunnel is planned to give a back of 1,723′. Tunnels are
as the Kathleen, Dewey, Bonanza, Rosalie and Anna. The Dewey tun-
hich cuts the vein diagonally, was 600′ long September, 1909, in a vein
ut 12′ estimated average width, carrying copper ore of 5% estimated
e tenor, with lead and silver values. The Bonanza tunnel is 210′ verti-
below the Dewey, and the Rosalie tunnel is 610′ vertically below the
. On the Bahkaama claim a 6′ fissure vein in granite was cut August,
carrying a 6″ paystreak of high grade bornite and chalcopyrite, with
e of ore of concentrating grade. Work has been pushed systematically,
nnels are being driven at the rate of about 200′ each per month. Dur-
e first 5 months of operation 3,042′ of development work was done, of
2,430′ was in ore and 612′ was in crosscuts, and mine is being opened
of about a quarter-mile monthly.
roperty has a good machinery equipment, with necessary mine buildings,
s developed ore of fair grade at a number of different points.

IN HIDDEN TREASURE COPPER CO. **MONTANA.**

ead. Was organized February, 1909, under laws of Minnesota, with
lization $500,000, shares $5 par, by Thos. A. Merritt, Fred H. Merritt,
Furness, Martin Rosendahl, J. L. Meixell and C. W. Andrus. Property,
ing lands of the Corbin-Wickes Copper Mining Co., was 7 claims, area
es, and the Parks Ranch of 40 acres, held under a $146,000 bond and
which was thrown up shortly after organization. Formerly at Corbin,
on Co., Mont.

OBA COPPER CO., LTD. **SPAIN.**

lice: 5 Queen Street Place, London, E. C., Eng. Operating office: Man-
9, Córdoba, Sevilla, Spain. Mine office: Estación de Cerro Muriano,
, Spain. W. Frecheville, chairman; Richard E. Carr, agent; preceding
, Lord Vaux, J. E. Champney, J. Taylor, Edgar Taylor and G. Corn-
West, directors; F. H. Williams, secretary; John Taylor & Sons, man-
W. H. Rundell, mine superintendent. Organized Aug. 5, 1908, under
f Great Britain, with capitalization £200,000, shares 5s par; issued,
shares, fully paid. Company is an amalgamation of the Cerro Muriano
Ltd., and the North Cerro Muriano Copper Mines, Ltd. Company gave
Muriano shareholders 2 fully paid shares for one fully paid preference
and one fully paid share for 10 fully paid ordinary shares, and the
ure of £18,000 held by North Cerro Muriano Copper Mines, Ltd. was
d, and holders of option over preference shares at par received an
over 70,000 shares of the new company, at par, expiring April 4, 1910.
olders in North Cerro Muriano received 2 fully paid shares for every
are of 19s. paid, and 20,000 shares were allotted to the holders of
fully paid shares, the 116,000 shares held in reserve by Cerro Muriano
canceled.
nds, 4C9 hectares, circa 10 miles from Córdoba in the districts of
a and Obejo, mainly held under perpetual lease from the state, with
leasehold tracts. Mine is served by the Ferrocarril Andaluces. Prop-
ows sundry old workings, dating from the Roman era, and these mines
orked by the ancients to a depth of at least 400′, notwithstanding their
s. The property shows 6 large and several small fissure veins, in mica-
diorite and quartzite, carrying chalcopyrite and pyrite, with gangue

of calcite, quartzite and country rock. Vei
12" to 40', with pro en lengths as follows:
Lorenzo, 4,575'; Isabel, 5,550'; Cerro Muria
old Roman workings assayed 28 to 34% co
Victoria, bottomed in the footwall at 726', a
very wet, which intersected the vein at dep
300 meters from the Santa Victoria, shows
with better portions worked out by the R
mine. The San Rafael shaft has a Hawthor
high-pressure cylinder having a 96" strok
with a 16' stroke, calculated to operate to a d
shaft, 300 meters from the San Rafael, sus
reserves were estimated, March, 1908, at 100,

Equipment includes 3 hoists and a 10
there is a small smelter on the property. T
and most interesting of the old Hispano-Rom
the Christian era, for the high quality of co
ores, but was entirely idle for nearly 2,000
the predecessors of the present company.

CORDOVA COPPER CO.

Mine office: Cordova, Alaska. C. Prel
Fleming Spit, about a mile from Cordova, i
small shipment to the Tacoma smelter, es
native copper.

CORDOVA COPPER CO.

Office: 403 Lonsdale Bldg., Duluth, Mi
Ariz. Henry B. Hovland, president; R. B. V
P. Smith, secretary; preceding officers, Loui
directors; Michael M. McCarthy, manager.
of Arizona, with capitalization $3,000,000,
Globe Consolidated Copper Co., which is co
and will be liquidated. The Globe stock
Cordova full paid stock, exchanged pari pass
20,000 shares of Cordova $2 paid stock we
shares of $2 paid Globe Consolidated, the pu
$2 paid, giving a total issue of 225,000 sha
treasury.

Lands include the former holdings of th
described page 721, also the Eureka group
mineral rights under the townsite of Cordova
site. Total holdings are approximately 1,00
solidated lands.

The Eureka mine, at Miami, between
Oak mines, shows, in the old workings near
of 5 to 10% copper tenor, and shipments w
agement of I. N. Kinsey, to the Old Dominion
for fluxing purposes. Production, 1907, was
Eureka is said to have produced about $400,0

New development on the Eureka by pres
partment Sullivan shaft, sunk on the Miami li
shaft encountered, at depth of 360', gray sc
chalcocite, with considerable carbonates, wit
2% copper. Crosscutting was begun on the
Pinal schist, carrying ore slightly below co

ed good, and property of promise, though results to date from both es have been somewhat disappointing.

VA EXPLORATION CO., LTD. SPAIN.

d. Company floated the Cerro Muriano Mines, Ltd. Was liquidated , 1908. Formerly at Córdoba, Sevilla, Spain.

VA-TACOMA COPPER CO. ALASKA.

ce: Tacoma, Wash. Mine office: Cordova, Alaska. Henry Hewitt nager. Mine, near Cordova, is about 1,200′ above sea-level, with a ower available. Ore is chalcopyrite, estimated to average 20% cop- mpany is said to plan installing a $75,000 plant, to operate on a new planned to turn out electrolytic copper from raw ore in the four opera- crushing, roasting, leaching and deposition.

CK BROS. MEXICO.

e office: Etzatlán, Ahualulco, Jalisco, Mex. Edward Finley, superin- Property is a 25-ton custom smelter, treating mainly ore from the l mines.

ÑÍA MINERA RAMÓN CORONA. MÉXICO.

e: San Pedro, Coah., Mex. Mine office: Naica, Camargo, Chihuahua, rancisco Madero, president; George Stimson, general manager. Prop- joining the Naica mine, carries considerable bodies of lead, silver and res, but apparently only silver-lead ore is being shipped.

LES MINING & MILLING CO. MEXICO.

e office: Rodeo, San Juan del Rio, Durango, Mex. Mine carries is copper ore. Equipment includes a small steam plant. Company l about 40 men at last accounts.

LAND MINING CO. ARIZONA.

e office: Courtland, Cochise Co., Ariz. John Dignan, manager. Organ- ca February, 1909, to develop a group of claims in the Dragoon ns, near Courtland.

Y COPPER DEVELOPMENT SYNDICATE, LTD. AUSTRALIA.

e: 1 London Wall Bldgs., London, E. C., Eng. Mine office: Goul- S. W., Australia. Max Michaelis and L. Breitmeyer, directors; Hugo acher, secretary. Organized March 27, 1907, under laws of Great with capitalization £45,000, shares £1 par; issued, 15,000 shares, aid in.

CREEK SOUTH COPPER MINING CO., N. L. AUSTRALIA.

e and mine: Shuttleton, Mouramba Co., N. S. W., Australia. Prop- th of Shuttleton, has a 125′ shaft, showing slight copper carbonate ut without appearance of commercial ore or a defined ore body. Idle rently moribund.

COPPER CO. ARIZONA.

e offices: Wendendale, Yuma Co., Ariz. Lands, circa 25 miles north- Wendendale, are developed by a shallow shaft and a 200′ tunnel.

GOLD & COPPER CO. WASHINGTON.

e office: Leavenworth, Chelan Co., Wash. Lands, 8 claims, at the head Creek, about 35 miles north of Leavenworth, said to show a 75′ vein ore giving high assay values in gold, silver and copper.

ER CONSOLIDATED MINING CO. UTAH.

e: Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. W. M. president; F. O. Frick, secretary and treasurer. Organized about March, ler laws of Utah, with capitalization $300,000, shares $1 par. Lands e Platus, in the Tintic district.

L COPPER CO. CALIFORNIA.

e office: Ingot, Shasta Co., Cal. W. S. Tyler, president; J. C. Mac- vice-president; L. L. Magruin, secretary and treasurer. Lands, 22

south of the Mountain Lake mine, about 3 miles from Heber, have a ift and 1,100′ of tunnels, showing a little ore giving assay values in lead, silver and gold.

AS CONSOLIDATED COPPER CO. **NEVADA.**

fice: Salt Lake City, Utah. Mine office: Bullion, Elko Co., Nev. P. D. , vice-president and general manager. Company succeeded the Delmas Co., circa July, 1908. Lands, in Leigh Cañon, 6 miles from a railroad, id to be extensive. Property shows a 30″ fissure vein of high grade iferous ore, and contact deposits in wollastonite, near granite, estimated to 200′ in width. Development is by a 170′ tunnel, planned to give a f 800′ at length of 1,600′. Mine is claimed to show 6′ of ore assaying up copper, 211 oz. silver and $9.60 gold per ton. Shipments of 20 carloads previous to end of 1908 are said to have given average returns of 10.5% and 70 oz. silver per ton. Property considered promising.

NG SMELTER. **NEW MEXICO.**

vned by National Mining & Smelting Co., at Deming, Luna Co., N. M.

RET VIEW MINING CO. **UTAH.**

fice: Ogden, Utah. Mine office: Lucin, Box Elder Co., Utah. C. A. looper, president; N. J. Harris, vice-president; W. A. Hickenlooper, ry; John Walker, treasurer. Organized September, 1908, under laws of with capitalization $25,000, shares 10 cents par.

A GOLD & COPPER EXPLORATION CO. **UTAH.**

ne office: Brighton, Salt Lake Co., Utah. Nicholas Schmittroth, presi- Anna Schmittroth, vice-president; John Boehmer, secretary and treasurer; ng officers, Hannah Boehmer, Frank B. Stephens, Vincent Schmittroth bt. E. Porter, directors. Property is in the Big Cottonwood district.

IZ DÍAZ. **PERÚ.**

fice and works: Cerro de Pasco, Junín, Perú. Property is two small g furnaces, known as San Miguel, of 6 to 8 metric tons daily capacity Rayo, of 8 tons daily capacity.

QUEEN COPPER MINING CO. **IDAHO.**

ine office: Sand Point, Bonner Co., Idaho. Andrew Christensen, general er; preceding officer, Wm. C. Ames, Chas. Edwards and Ignatz Weil, rs. Capitalization $500,000. Lands, 5 claims, in the Lakeview district.

EL CHOUICHIA MINE. **TUNIS.**

ine office: Souk El Arba, Tunis. Property carries mainly malachite and , with occasional chalcopyrite and tetrahedrite, in limestone near a t with hematite. The antimony and arsenic in the tetrahedrite produce rable speiss. The smelter has two 30-ton circular water-jacket blast- es, using coke, costing f65 per ton delivered, to the extent of 13.5% of pper ore charge. Silicious flux is used generally, but occasionally the e of oxidized ores and pyrites is smelted without flux. Product is speiss pper matte of 35% to 50% copper tenor, sold mainly in Italy, for the acture of copper sulphate.

& VOELKER. **MEXICO.**

ne office: Ayutla, Autlán, Jalisco, Mex. Property is the Guadalupe mine, which small shipments of high grade copper ore with silver values have ade.

LD COPPER CO. **BRITISH COLUMBIA.**

fice: Spokane, Wash. Mine office: Midway, Boundary district, B. C. Tilsley, president; C. R. LeMaster, secretary; J. T. Van Haas, consulting er; J. D. Graham, superintendent. Lands, known as the Bruce group, 1 rom a railway, with wagon road connecting, have about 400′ of tunnels, a vein showing ore assaying 5 to 6% copper and $5 to $6 gold per ton, 10′ vein of ore is shown in an opencut.

DONKEY MINE.

Owned by Western Zinc Mining Co., at Ingo

DONNELLY MINING & REDUCTION CO.

Mine office: Lake City, Hinsdale Co., Colo. Property carries auriferous and argentiferous lea includes water power and an air-compressor.

DOUGLAS-ARIZONA-SONORA DEVELOPMEN

Office: Douglas, Ariz. Mine office: Patagoni Raines, president; P. J. McIntyre, treasurer. Queen group, adjoin the World's Fair mine on t carry the extension of the World's Fair ore bod a series of ore bodies carrying high values in silv

DULUTH-MOCTEZUMA MINING CO.

Office: 707 Lonsdale Bldg., Duluth, Minn. M Mex. Geo. H. Mance, president; Geo. H. Crosb McLeod, secretary; Will C. Brown, treasurer; C Bennett, superintendent. Organized February $500,000, shares $10 par; issued, $300,000.

Lands, 370 acres, in 5 groups, including 4 id and the Monte Cristo silver mine. Four group Monte Cristo is held under a $200,000 bond an been paid, bond running for 3 years, with prov returns applies on purchase price.

The Azurite group, area 14 hectares, betwee and the Lampazos silver-lead mine, shows at su streak carrying carbonate ore assaying upward gold and silver values.

The Caballo de Fierro copper group, area Mountains, 16 miles east and south of Nacoza specular and magnetic iron, carrying considerabl at surface.

La Concha copper group, area 22 hectares, 6 miles west of the Southern Pacific line, now b 4′ to 10′ width, in porphyry, outcropping for argentiferous copper ore, and small shipments of by former owners in the past.

The Idaho group, area 26 hectares, and the 29 hectares, are adjoining properties, 14 miles s contact ore body between limestone and porphyr showing ore giving average assays of 14% lead

The Monte Cristo mine, area circa 300 acre was opened October, 1903, and, operated in nati 132′ level, upwards of 1,300,000 oz. of silver, the management giving smelter returns averaging a ton. The vein, of 4′ to 5′ average width, dips at in the upper levels, but holds ore values unchang of the present workings. There are about 2,000 incline shafts and a short tunnel, and present partment shaft, January, 1909, this being vert following the dip of the vein to the present d showing in the bottom. The ore contains much galena, and carries magnificent specimens of n native silver, ranging in value up to 1,300 oz. silv under present management, to Nov. 15, 1909, wa smelter returns of better than $11,000 per ca

ds of $12,000, and the mine has in sight 7 to 10 carloads of similar ore. he Southern Pacific railway extension, building from Nacozari south, reach the Monte Cristo mine eventually, but, owing to the extremely grade of ore produced, present transportation charges by pack train are serious adverse factor. Equipment includes a 40-h. p. boiler and hoist. gement is good, and property is exceptionally valuable, and is now earning rate of about 10% on the total capitalization, only 60% of which is

TH-PACIFIC COPPER CO. **WASHINGTON.**

ffice: Duluth, Minn. Mine office: Chelan, Chelan Co., Wash. A. C. ack, president; A. Keller, vice-president; Louis Hammel, treasurer; H. nn, secretary; preceding officers, W. L. Devine, A. H. Grieser and J. D. bell, directors; Arthur C. Fox, superintendent; Victor L. Rakowsky, con- g engineer. Organized 1909, under laws of Arizona, with 500,000 shares. al meeting, second Tuesday in June.

ands, 12 claims, including the Copper Glance and Copper Goat groups, of ms each, 1½ miles apart, well timbered and watered, 25 miles from a ad, with good wagon roads 5 and 8 miles distant respectively, in the t Stewart district, Wenatchee Mountains. Lands carrying fissure veins in otite, and contact deposits between gabbro and peridotite, and are said to an 18" vein of chalcocite and bornite, averaging 35 to 40% copper, with and silver values. Development is by a crosscut tunnel. Equipment les an air-compressor.

UTH & SONORA MINING CO. **MEXICO.**

)ffice: 606 Sellwood Bldg., Duluth, Minn. Mine office: La Cananea, Arizpe, a, Mex. James W. Norton, president and treasurer; A. E. Purden, vice- dent; Bernard Silberstein, second vice-president; Wm. B. Underhill, secre- Organized December, 1908, under laws of Minnesota, with capitalization 0,000, shares $10 par. Absorbed the Calumet & Sonora Mining Co., giving corporation 120,000 shares for its properties, and also absorbed the South nea Copper Mining Co., S. A., which was the Mexican incorporation of the sylvania & Cananea Copper Co., giving 120,000 shares to latter, leaving 0 shares in the treasury.

Lands are said to be circa 4,500 acres. Lands taken over from the South nea were 587 hectares, including the Collins group of 305 hectares, Arizpe p of 40 hectares, Homestead group of 60 hectares, Last Chance group of ctares and Gladys group of 150 hectares, latter adjoining the Massey mine ie Greene Cananea and supposed to carry the extension of the Massey ore of the latter, the bulk of the South Cananea lands being 3 to 4 miles south ie Oversight mine of the Greene Cananea. The Collins group has a 250' t.

Lands taken over from the Calumet & Sonora Mining Co. include the ia Vista group of 306 acres, Catalina group of 630 acres, on which the prin- l developments are located, and the Ronquillo-Duluth group of 210 acres. Buena Vista group, near the Greene Cananea, has the 100' Underhill shaft, Norton shaft, and a 552' crosscut tunnel showing a vein of 57' width, ying sulphide ores with talcose gangue assaying 1.25 to 1.75% in copper r, which is below commercial grade. The Catalina has 2 old shafts, of 75' depth each, and a new 205' shaft, with about 900' of workings, showing from surface of fair average grade. A 16-ton test shipment from the Cata- workings returned 3.64% copper, 53% lead, 113 oz. silver and $20 gold ton.

The Catalina group has a 150-h. p. machinery plant. Property considered ising.

DUNKIRK MINE.

Owned by Castle Copper Co., at Prescott, Y

DUQUESNE MINING CO.

Mine office: Globe, Gila Co., Ariz. John F Edw. S. Strawcutter, vice-president; T. A. Lukh in Gold Gulch, about 15 miles from Globe. Old a 50′ shaft on the East End claim, showing ore and $4 gold per ton, also 3 short tunnels, givi gold. Equipment includes necessary mine buil ing a 500′ shaft and crosscutting from the botto shaft.

DURANGO INVESTMENT & DEVELOPMEN

Office: Callejón Santa Vera Cruz 20, Méxic cisco del Mezquital, Durango, Mex. Sr. Lic. J Sanciprian, general manager; Francisco Sosa Organized under laws of United States, with protocolized under laws of Mexico. Property mines, in the Mezquital district, and La Fé min all antiguas, carrying ores of gold, silver and Properties are said to have produced 1,800,000 pany has a concession for use of water from purposes.

COMPAÑÍA MINERA EL DURAZNITO.

Office: Apartado 102, Durango, Mex. Mine Edw. Williams, president; Alejandro Tagle, secr F. D. Davis, manager. Organized March, 190 capitalization 60,000 pesos, shares 10 pesos par. silver-lead and 1 silver-copper vein, former havi and 6 kgs. silver per metric ton, and latter said 8 kgs. silver per ton. Development is by 2 sh each, and a 180-meter tunnel.

D. & W. MINING CO.

Office: Johnston Bldg., Los Angeles, Cal. Ariz. John W. Flink, president and general ma president; Jas. S. Roche, secretary. Lands district of San Bernardino County, California, a line of the California & Arizona railroad, 17 m 40 miles south of Needles. Property shows 2 pa width, on which work was begun 1907. Develo 375′ shaft, showing ore that has given assays $52.50 gold per ton, and a carload of ore, shippe 30% copper. Equipment includes an 18-h. p. g engine and an air-compressor.

EAGLE MINING & SMELTING CO.

Mine office: Chewelah, Stevens Co., Wash. 6 claims, 3 miles from Chewelah, including the E owned by Eagle Consolidated Gold Mining & Mil Mining Co. Mine has a 240′ two-compartment s ing a 4′ vein of silver-lead ore, said to parallel Copper Co. at a distance of 400′. Equipment developing with a small force at last accounts.

EAGLE MOUNTAIN COPPER CO.

Mine office: Kelvin, Pinal Co., Ariz. Col. P Lands, 27 claims, known as the Copper Queen g

g small development and several mine buildings. Company was said, June, also to have an option on the Blackburn group.

E PEAK MINING CO. **WASHINGTON.**

ffice: Longmire, Pierce Co., Wash. Lands, in the Tatoosh range, in the ty of Mt. Tacoma, are said to show bornite.

COLUMBUS MINING CO. **UTAH.**

ffice: Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. Tony son, president; A. O. Jacobson, vice-president; Valentine S. Snow, secre- Organized December, 1908, under laws of Utah, with capitalization 00, shares $1 par. Company was promoted to take over the Silver King at Alta.

GRIQUALAND COPPER & NICKEL MINING CO., LTD. **CAPE COLONY.**

ffice: 97 New Stock Exchange, Johannesburg, Transvaal. Mine office: yliff, Griqualand East, Cape Colony. Geo. Peel, chairman; preceding , Dr. Davie Thompson and Griff Evans, directors. Organized December, under laws of Transvaal, with capitalization £12,500, shares £1 par, of £7,000 went to vendors and £1,500 remain unissued, for reserve, giving for working capital.

ands, 44 morgen, on the Insizwa range, near Mt. Ayliff, held on a 99-year which carries a royalty of 2s. 6d. per long ton on ore, payable to the nment, plus a royalty of 1% on the gross amount realized from ore. A of ore, shipped circa May, 1909, to Great Britain, for treatment, carried r, nickel and platinum. Some ore has been found assaying up to 2.25 oz. um per long ton, with small silver and cobalt values.

TINTIC DEVELOPMENT CO. **UTAH.**

Mine office: Eureka, Juab Co., Utah. Ralph Kellogg, manager. Lands, n as the Ralph group, carry the Mammoth limestone formation. Develop- is by a new 330′ shaft, with a crosscut on the 225′ level cutting a vein ′ estimated average width, showing ore carrying up to 60% lead, with gold and a small quantity of silver, 4 carloads shipped therefrom, up to 18, 1909, having netted about $600 per car. Mine also shows a 5′ vein on ast drift of the 230′ level. Equipment includes a new power plant, led 1909, and there are necessary mine buildings.

TINTIC EL RAY MINING CO. **UTAH.**

Mine office: Eureka, Juab Co., Utah. Paul Brockman, president; E. Ride- vice-president; D. J. Bussard, secretary; S. W. Bussard, treasurer; preced- fficers and A. Soderlund, directors. Organized April, 1909, under laws of with capitalization $50,000, shares 5 cents par. Lands, 6 claims, adjoining ast Tintic Gold King mine.

TINTIC TERMINAL MINING CO. **UTAH.**

)ffice: Provo, Utah. Mine office: Eureka, Juab Co., Utah. John Bestel- r, president; Wilford F. Giles, vice-president; Royal T. Barney, secretary treasurer; preceding officers, John M. Bestelmeyer, J. W. Beasley and d L. Booth, directors. Organized circa May, 1909, under laws of Utah, capitalization $100,000, shares 10 cents par. Property is in the northern of the East Tintic section, near the East Tintic and Grutli mines.

IPSE MINE. **AUSTRALIA.**

Mine office: Wertago, Yungnulgra Co., N. S. W., Australia. Lands, 80 , 60 miles from Wilcannia. Mine, discovered 1892, has a 4′ vein in mica- t and slate, developed by a 140′ shaft, showing, on the 108′ level, a vein ″ maximum width, carrying sulphide ore of good grade. Production, 1905- was 200 long tons of ore, of 25 to 30% copper tenor, and production, is estimated at 60,000 lbs. fine copper. Was working, with a very small , at last accounts.

COMPAÑIA MINERA y BENEFICIADORA

Office: Segunda Calle de Mesones 22, M
Zacatecas, Mex. Francisco Llamosa, preside
Gutierrez, secretary; Luis Colina, superint
organized 1907, under laws of Mexico, with
100 pesos par. Lands, 102 hectares. Mine
tunnels aggregating 1,120' in length, with c
developing ores of gold, silver, copper, lead

There is a mill with 40 stamps, 2 Krupp
Johnson tables, and it is planned installing
amount of tailings accumulated, the dump
500 grams silver and 3 to 5 grams gold per

EDISON MINING & MILLING CO.

Mine office: Red River, Taos Co., N.
Property carries auriferous and argentiferou
a steam plant and 10-stamp mill.

EL AGUAJE MINING CO.

Mine office: Moctezuma, Sonora, Mex.
the smaller copper-silver veins south of the
watered, July, 1909, with a view to sale.

EL CORRAL GOLD & COPPER CO.

Office: Rosario, Hidalgo, Chihuahua,
Capitalization $50,000. Property is La Gra
carrying copper, gold and silver values.
workings.

ELIZABETH COPPER MINING CO.

Mine office: North Yakima, Yakima Co
ore, and company is reported to have a 50-to

ELY STAR MINING CO.

Office: Columbus, Ga. Mine office: Ch
J. F. Weathers, president; W. S. Anderson
secretary and treasurer. Capitalization $1,
claims, known as the Black Metal group, an
5 miles north of Cherry Creek, developed b
Company claimed, 1907, to have 300 tons of
70 oz. silver per ton.

EMERALD MINE.

Mine office: Tamworth, N. S. W., Austr
manager. Property, at Trough Gully, 15 mil
to average about 7.5% copper, with a trac
furnace was built, 1908.

EMERALD MINING CO.

Mine office: Eureka, Juab Co., Utah. J.
has an 1,100' shaft, showing a narrow but ric

EMPIRE COPPER CO.

Mine office: Santa Rita, Grant Co., N. M
treasurer; John Asheroft, vice-president; F. C
circa July, 1909, to develop copper claims ne

EMPIRE COPPER SYNDICATE, LTD.

Office: 20 Lawrence Lane, London, E. C.,
man; preceding officer, A. du V. T. Green,
directors; G. Thompson, secretary. Organized
Britain, with capitalization £2,000, shares £1
option on the Rainy Hollow copper claims, s
Trust, Ltd. Apparently no work has been do

RE GOLD-COPPER MINING CO. **ARIZONA.**
ine office: Dragoon, Cochise Co., Ariz. Lands are the Princess group, near
n station, having an 80′ two-compartment shaft, bottomed in sulphide ore
assays up to 40% copper, 6 to 7 oz. silver and $1 gold per ton.

RPRISE DEVELOPMENT CO. **MEXICO.**
ine office: La Cananea, Arizpe, Sonora, Mex. T. H. Collins, president;
Mitchell, vice-president; J. E. Morrison, secretary; Chas. McHenry, gen-
nager. Organized June 7, 1907, under laws of Arizona, with capitaliza-
00,000, shares $5 par. Corporation presumably was organized to take
e South Cananea, as officers are closely connected with that property.

RPRISE MINING CO. **COLORADO.**
ad. Succeeded Enterprise Mill & Mining Co., and was merged, circa
n Swarthmore Consolidated Mining Co. Formerly at El Dorado, Boulder
lo.

MINING CO. **MEXICO.**
ine office: La Cananea, Arizpe, Sonora, Mex. Wm. Bracken, president;
Hilliard, vice-president; Geo. L. Grosvenor, secretary and treasurer; pre-
officers, Edward Quirk and Verner de Guise, directors. Organized Jan.
09, under laws of Mexico. Property supposedly is claims in vicinity of
anea. Apparently no work has been done.

RANZAS MINING CO. **MEXICO.**
ine office: Estación Symon, San Juan de Guadalupe, Durango, Mex.
Steel, general manager. Capitalization $200,000. Property includes the
ña de Cobre, Esperanza and other claims. Presumably idle.

KA CITY MINING CO. **UTAH.**
ine office: Eureka, Juab Co., Utah. Walter Fitch, president. Organized
with capitalization $1,000,000, shares $1 par. Is controlled by Chief
lidated Mining Co., which took $510,000 of the capital stock, under agree-
with the company to furnish funds for development work, as needed, in
t not to exceed $100,000. The Chief Consolidated turned over to the
a City Mining Co. its option on 3 claims covering part of the townsite of
a. Balance of shares are to be turned over, as necessary, to owners of
state in the city of Eureka, in exchange for deeds covering their mineral
, with the provision that no mining shall be done nearer surface than 700′.
is being given to owners of lots on the basis of about 1,000 shares per
The Chief Consolidated owned options on 3 claims, covering a large part
townsite, which the government decided was not mineral land, though it
nly is. This tract is to be developed from the 1,800′ level of the Chief
lidated, through a main drift to be driven northward. The plan followed
nizes conflicting interests, and renders available for development a val-
property heretofore impossible to work. Management is excellent and
ty decidedly promising.

KA COPPER MINING CO. **ALASKA.**
ffice: Los Angeles, Cal. A. L. Bergen, president; Mrs. M. F. Roberts,
ary; E. L. Terry, director. Capitalization, 300,000 shares. Lands sup-
y are in Alaska. The president and secretary were arrested, Oct. 2, 1909,
rious charges of embezzlement, preferred by one Terry, a director, who
s that Bergen held 190,000 shares of capital stock, and that his books
ted serious discrepancies in the accounts. The charge against Mrs.
ts was that as secretary she entered the sale of $150 worth of stock at
90, and retained $60 for her own use and benefit. The answer of the
ent was that he owns one-half of the capital stock, and that he had sold
shares of individual stock at reduced prices, claiming that the company
him $2,500, and that his arrest was due to spitework. Apparently the

president and secretary sold their own stoc
pany was endeavoring to sell stock. Is not

EUREKA LILY MINING CO.

Mine office: Eureka, Juab Co., Utah. C
rett, vice-president; R. S. Bowman, secret
$1,000,000, shares $1 par. Controls the Lily
about two-thirds of issued stock; also conti
several other claims, on Mineral Mountain,
to carry good lead values, with considerable
ment being a 300′ shaft.

EUREKA MINES CO.

Mine office: Orogrande, Otero Co., N. M
Ira G. Ross, vice-president; Geo. E. Mitche
secretary; Fayette A. Jones, consulting eng
of Arizona, with capitalization 5,000,000 sh
1,600,000 shares are in 8% preferred stock.
pany, said to control the Boston-Jarilla
Eureka Placer Mining Co. and Mollie Gibs
own a third interest in 360 acres of placer
fornia. Lands controlled in New Mexico ar
480 acres of placer claims, including the H
of what is known as Nanny Baird Hill, this
Gibson group, of circa 100 acres area, has a
125′, claimed to show rich sulphide copper or
the company to show, by hundreds of test
yard, which statement is considered some
Barnard, the former president, operated an
name of M. C. Barnard & Co., in Boston, a
with liabilities of $252,141. Is not regarde

EUREKA MINING CO.

Mine office: Chalchihuites, Sombrerete
manager. Property includes the Eureka
include silver-lead deposits of good averag
copper veins, and numerous zinc outcroppi
of high grade iron ore, suitable for flux, and

EUREKA MINING CO.

Mine office: Eureka, Juab Co., Utah.
are listed on the Salt Lake stock exchange
Tintic district.

FAIRVIEW MINING CO.

Mine office: Relief Hill, Nevada Co., C
Lands, 8 claims, area 160 acres, showing a
footwall, with a vein up to 12′ in width,
gossan. Development is by a 375′ tunnel
showing cuprite and chalcopyrite, with some
iron oxide, giving average assays of 1.1%
per ton. Nearest railroad point is Nevada
cut on the hill was worked for gold, by slui

FANNY FERN MINING CO.

Mine office: Lake City, Hinsdale Co., C
Property carries copper and silver-lead ores,
small force at last accounts.

COMPAÑÍA MINERA FARELLON DE PU

Dead. Was succeeded by Compañía
Rancagua, Atacama, Chile.

ÑIA MINERA LA FÉ, CARIDAD Y ANEXAS. **MEXICO.**
ce: Mexico, D. F. Mine office: Guachinango, Mascota, Jalisco, Mex.
Marx, president; Andres Goebel, treasurer; R. Aguirre, secretary; Rich-
anther, general manager. Organized under laws of Mexico, with capi-
n 250,000 pesos. Ore carries values in copper, silver and gold, and
ipments of high grade ore have been made.

AL EXPLORATION CO. **CALIFORNIA.**
ce: 370 Bullitt Bldg., Philadelphia, Pa. Mine office: Ingot, Shasta Co.,
ands are 4 claims in Township 33 North, Range 6 West, adjoining the
th mine, showing a gossan outcrop, on which an incline shaft has been
Presumably idle.

AL GOLD & COPPER MINING CO. **UTAH.**
ne office: Frisco, Beaver Co., Utah. Lands, 9 claims, 4 patented, in the
Lake district, about 3 miles from the San Pedro railroad and 8 miles
risco, having a 400' shaft and 100' drift showing no ore, though prop-
said to have shipped about 200 tons of rich ore under former owner-
Equipment includes several mine buildings. Idle at last accounts.

TÉ ANONYME DES MINES DE CUIVRE DU FERROL. **SPAIN.**
ice: 13 Rue Auber, Paris, France. Mine office: Ferrol, Coruña, Spain.
er, J. de Catelin, L. A. Claudot, P. Dubois, L. Jumentier, E. Maranzana
de Montrichard, directors; H. Dufresne and R. de Thezillar, commis-
Organized Jan. 25, 1907, under laws of France, with capitalization
00, shares f100 par. Is said to plan reduction of capital to f3,000,000.
ny was said, 1909, to have a deficit of f38,413. Property stands much in
f cheap transportation, now lacking.

MINES, LTD. **BRITISH COLUMBIA.**
ne office: Fife, Yale district, B. C. Chas. Dempster, general manager.
30 miles east of Phœnix, show a vein up to 30' in width, carrying about
melting ore, with balance of concentrating grade, developed by a glory-
Property shows considerable chalcopyrite carrying gold and silver values,
has been claimed to average 3 to 6% copper and $4 to $8 gold per ton.
verage of 30 assays of ore from the dump gave 5.3% copper and $4.20
er ton. Equipment includes substantial mine buildings and an assay
Some ore was shipped, 1909, to the Trail smelter, and company was
oring, September, 1909, to arrange with the Canadian Pacific for ore
nts. Property considered promising.

ISH FARMERS' MINING CO. **MICHIGAN.**
ine office: Hancock, Houghton Co., Mich. Property is options on farming
between Salo and the upper ship canal, northwest of Hancock.

STAFF MINES, LTD. **UTAH.**
ead. Property held, 1908, by Flagstaff Copper Mining Co. Formerly at
Salt Lake Co., Utah.

STAFF MINING CO., LTD. **IDAHO.**
line office: Osburn, Shoshone Co., Idaho. F. T. Millichamp, president; F.
y Millichamp, secretary. Capitalization $1,000,000, shares $1 par. Lands,
ns, 3 miles from a railroad. Development includes a 25' shaft and a 350'
l. Traces of lead, copper, silver and gold have been encountered.

PAÑÍA MINERA EL FLOR DE NIEVE. **MEXICO.**
Mine office: Concepción del Oro, Mazapil, Zacatecas, Mex. Lands, 30 hec-
showing several cupriferous veins. Was developing, in a small way, at
ecounts.

RENCE-RAE COPPER CO. **WASHINGTON.**
line office: Index, Snohomish Co., Wash. Lands, on North Fork, above
a, were under development with a small force late in 1

Welsh, president; A. R. Short, secretary. Lands, 35 claims, carrying argentiferous ores of lead, copper and zinc. Has able, on Lone Pine Creek, and also has partly built an from mine to smelter. The Swansea smelter was built, ci and removed later to Swansea, 3 miles north.

FREEHOLD COPPER PROPERTIES, LTD.

Dead. Former office was 308 Winchester House, L Officers were A. E. Barton, chairman; presiding officer, Ch L. Abrams, directors; H. A. McMahon, secretary; W. H. Was organized Jan. 14, 1908, under laws of Great Britain, £12,000, shares £1 par, and took over, May, 1908, the Crowl ton mines from the Crowl Creek-Shuttleton Mining Co. July, 1908, to Nymagee Copper, Ltd. Formerly at Shuttle N. S. W., Australia.

FREMANTLE SMELTERS & MINES, LTD. WEST

Works office: Fremantle, Western Australia. W. G. S Organized July, 1909, under laws of Great Britain. Proper smelter, at Robb's Anchorage, near Fremantle.

FRISCO CONSOLIDATED MINING CO.

Office: 209 Dooly Blk., Salt Lake City, Utah. Mine of Co., Utah. D. P. Rohlfing, president and general manage capitalization $1,500,000, shares $5 par, as a merger of Mining Co. and North Horn Silver & Copper Mining Co. La 580 acres, supposedly carrying the extension of the Horn S for 8,600'. Lands include properties formerly held by the North Horn Silver, also the Goodhope, Glorious and D. G. &

The Frisco Contact property has a 550' two-compartme also are three other shafts, and several tunnels, with abo workings, showing 4 contact deposits between limestone and estimated to range up to 115' in width, and to carry 15% co zinc, 45 oz. silver and 80 cents gold per ton.

Equipment includes a steam plant, with hoists of 50 an air-compressor, pumps and necessary mine buildings. The adjoining, has been a very large producer, and the Frisco Co is considered promising, though as yet no important ore

TERIZA COPPER MINING CO. **MEXICO.**
ine office: Ascensión, Galeana, Chihuahua, Mex. Property is La Fron- mine, carrying silver, copper and lead ores. Presumably idle.

O HERMANOS. **PERÚ.**
ffice and works: Cerro de Pasco, Junín, Perú. Property is El Carmen r, having a 6-ton matting furnace.

IMO GARCÍA. **MEXICO.**
ine office: Zautla, San Juan de los Llanos, Puebla, Mex. Property in- Nueva Reserva, Sahara, San Luis and Ampliación de San Luis mines, ng argentiferous copper ore, and was a small producer at last accounts.

CONSOLIDATED MINING CO. **NEVADA.**
ine office: Tenabo, Lander Co., Nev. Hyrum Tyree, president; W. L. gher, secretary. Capitalization, $2,500,000. Company took over the prop- f the Reliance Mining & Milling Co. Lands, 19 claims, 2 fractional, area cres. Principal development is on the Little Gem group, about one mile Tenabo, showing a contact deposit between rhyolite and sedimentary carrying auriferous and argentiferous copper carbonates and chalcopyrite, quartz gangue. Development is by a 250′ incline shaft, sunk at an angle °, showing an ore body ranging from a few inches to 5′ in width, giving s up to 31.1% copper, 122 oz. silver and $9.60 gold per ton. In January, company planned transferring its holdings to the Tenabo Mining & Smelt- o., but suit was brought against the management by shareholders, and a er asked.

DYS PROPRIETARY GOLD MINES, LTD. **MEXICO.**
Office: 35 Albemarle St., London, W., Eng. Mine office: Vencedora, lgo, Chihuahua, Mex. A. Spencer Cragoe, general manager. Organized 4, 1900, under laws of Great Britain, with capitalization £800,000, shares ar, fully issued. Company began work on the De Kaap goldfield, near erton, Transvaal, but in 1905 transferred operations to Chihuahua, pur- ng El Bronce, El Campanito, La Margarita and La Polonia groups of s, area 62 acres, at Beneficiadora. Lands show 8 ore bodies, reported as s, but apparently contact deposits between limestone and porphyry, carry- chalcopyrite, galena and lead carbonates, all auriferous and argentiferous, quartz gangue, with some silver chlorides and sulphides. Work was begun 1, 1906, and property has a 305′ shaft and two 300′ tunnels, with about ′ of workings, developing a considerable tonnage of ore of low to medium e. Equipment includes a 160-h. p. steam plant, and management plans a on mill. Employs circa 100 men.

IVA-SIOUX MOUNTAIN MINING CO. **UTAH.**
Mine office: Eureka, Juab Co., Utah. Lands, adjoining the Plutus mine, a 500′ tunnel on the Smuggler claim. Idle several years, but resumption ned at last accounts.

D BASIN MINING CO. **COLORADO.**
Mine office: Montrose, Montrose Co., Colo. Property carries auriferous and ntiferous copper ores. Equipment includes a steam plant and 100-ton idle plant, employing about 20 men.

D CLIFF MINING CO. **WYOMING.**
Mine office: Sundance, Crook Co., Wyo. Wm. McMillan, general manager. ls, 14 claims, in the Kirwin district, carrying several veins of ore giving assays in copper, gold and silver. Development work was in progress, ember, 1909.

D & COPPER CROWN MINING CO. **CALIFORNIA.**
Mine office: Needles, San Bernardino Co., Cal. E. H. Norton, president; Walford, secretary; H. A. Norton, treasurer. Lands, 6 claims, in the ise Mountains, 10 miles south of Needles, showing fissure veins with

numerous outcrops. Development, at depth
assaying up to 60% copper, with a mill test

GOLD CROWN MINING CO., LTD.

Office: Wallace, Idaho. Mine office: St
Mayo, president; L. P. Wolfe, secretary.
par. Lands, 5 claims, 7 miles from a rail
width, with quartzite footwall, carrying
silver and gold. Development is by 125' an

GOLDEN CURRY CONSOLIDATED MINI

Mine office: Elkhorn, Jefferson Co., Mo
Mine carries auriferous copper ore, with
includes a hydro-electric power installation,
plant.

GOLDEN SUN MINING & MILLING CO

Office: 203 Kittredge Bldg., Denver, Col
Colo. E. T. Butler, manager. Mine, under
argentiferous copper ore, equipment includ
pressor.

GOLD HUNTER MINING CO.

Office: St. Paul, Minn. Mine office: M
Ryan, general manager. Mine, discovered
silver-lead vein with a back of 1,400', and
to have struck ore on a 30' vein at depth
ore, but values are mainly in silver and lea
employs about 200 men normally. Some ore
Salida smelter.

GOLD MINING CO.

Mine office: Silverton, San Juan Co., C
Scott, superintendent. Property includes th
ing auriferous and argentiferous copper
power plant and a small Leyner air-compre

GOOD HOPE GOLD & COPPER MINING DEVELOPMENT CO.

Office: Aurora, Ore. Mine office: Ind
Snyder, president; Capt. J. F. Boon, vice-p
and treasurer; preceding officers, H. L. Be
Thompson, directors; Wm. J. Walters, gene
of Washington, with capitalization $1,000,0
in process of patenting. Mine has 6 tunnel
assaying circa 2% coper and 12% lead, wi

GOONEY MANOR COPPER CO.

Office and mine: Front Royal, Warren
Naylor, president and general manager; R
Walker, secretary; W. P. King, treasurer
engineer. Organized July 12, 1909, under l
$500,000, shares $100 par; issued, $30,100.
bond for $3,000, due July, 1911. Annual me

Lands, 84 acres, 5 miles south of Fron
vein in porphyry, and contact deposits bet
generally northeast and southwest strike an
is reported to average 7' width, and to h
malachite near surface, with chalcopyrite
smelter test, of 5.08% copper and 1.36 oz. sil
are lenticular. Development is by a 45° ope
without laterals, estimated by company to

xcessive. Equipment includes a 15-h. p. steam plant, with a 13-h. p. od for 800′ depth, and a 1-drill Rand air-compressor. Buildings include y, engine-house, tool-house and dwelling. Company plans developing the ly for about 1,000′ in length, and installing a larger hoist and air- ssor.

R MINES SYNDICATE, LTD. **COLORADO.**

ice: 155 Fenchurch St., London, E. C., Eng. Mine office: Blackhawk, Co., Colo. Dr. J. H. Gower, chairman; preceding officer, W. M. Strachan, rbert Wright, A. Montague Haines and John P. Reid, directors; W. F. secretary; Thos. Dunstone, mine manager. Organized Jan. 19, 1898, laws of Great Britain, with capitalization £15,000, shares £1 par, fully and fully paid. Lands carry auriferous and argentiferous lead and ores. Equipment includes a steam plant.

D DOMINION COPPER CO. **UTAH.**

ice: Salt Lake City, Utah. Mine office: Minersville, Beaver Co., Utah. Reese, president and general manager. Lands, 80 acres, having a 275′ with a 250′ back, showing ore assaying up to 26% copper, 10 oz. silver gold per ton, from an 18″ vein.

D EASTERN MINING CO. **UTAH.**

fice and mine: Eureka, Juab Co., Utah. E. R. Higginson, president; C. ry, secretary and treasurer; preceding officers, A. F. Baxter, W. E. ury and John A. Allen, directors. Organized circa March, 1909, under f Utah, with capitalization $100,000, shares 10 cents par. Lands are 11

D ISLAND MINING CO. **ARIZONA.**

ine office: Jerome, Yavapai Co., Ariz. Organized circa October, 1908. adjoining the Copper Chief on the south, showed good ore, in compara- shallow workings, when taken over. Development is by a 100′ two-com- nt shaft, planned to be sunk to 200′, showing a 3′ vein carrying sulphide saying up to 22% copper. Equipment includes a steam hoist.

T MINE. **NEW YORK.**

etter returned unclaimed from former mine office, Carmel, Putnam Co., Ores are decidedly complex, consisting of sulphides and arsenides, car- copper, quicksilver, gold and iron. The crude ore is estimated to have s value of about $25 per ton, but, on account of its refractory nature, has sent commercial value, and cannot be utilized without special treatment. ome years.

T BENOWRIE COPPER & SILVER MINING CO. SOUTH AUSTRALIA.

ead. Property was 1,800 acres of leasehold crown lands, 16 miles from ad at Mingary, said to carry 10 veins with east and west strike, averaging 5′ width, developed by a shaft of 100′ showing ore that was dressed up out 20% copper tenor. Company was liquidated circa 1899. Formerly at ary, South Australia.

AT BRAS D'OR GOLD MINING CO. **NOVA SCOTIA.**

ffice: 616 Old South Bldg., Boston, Mass. Mine office: Goldbrook, Cape n Co., N. S. Theodor Kuntzen, manager. Mine carries auriferous copper with values mainly in gold. Equipment includes a steam plant and an air- ressor, with a 10-stamp mill and 40-ton concentrator. Property employs 35 men.

AT COPPER FLAT MINING CO. **UTAH.**

fine office: Alta, Salt Lake Co., Utah. Lands are in the Draper district, the mouth of Little Cottonwood Cañon. Company planned, July, 1909, ng in the Verna Mining Co. Presumably idle.

AT COPPER KING MINING CO. **UTAH.**

fine office: Alta, Salt Lake Co., Utah. Lands, 10 claims, including 4

Dead. Company was organized November, 1872, and
erties near Lewis Ponds and Byng, and, in 1875, was work
at Icely, 30″ wide at surface, 5′ wide at 125′ depth and 3
Company had a small smelter in connection with the Ice
from its various properties. From the Williams lode 4,0
returned 560 long tons of copper, and 1,000 tons of ore
returned 100 long tons of copper. Miscellaneous lodes yi
returning 12 tons copper, and at Lewis Ponds Creek th
lodes, of 3′ average width, which yielded 4,000 tons of o
long tons of copper. Formerly at Lewis Ponds, N. S. W.,

GREEN RIVER COPPER CO.

Mine office: Superior, Pinal Co., Ariz. Hon. G. Irv
Dougherty, secretary. Lands, 14 claims, near the Lake
showing oxidized ores and chalcocite giving assays up t
sumably idle.

GREY EAGLE GOLD MINING CO. BE

Dead. Was merged, March 29, 1901, in Granby
Smelting & Power Co., Ltd. Formerly at Phoenix, Bounda

GREY ROCK MINING CO.

Mine office: Eureka, Juab Co., Utah. C. C. Grig
Badger, secretary; Geo. Udall, managing director; prec
Badger and Frank Birch, directors. Organized 1909, pr
of Utah. Lands, 12 claims, adjoining the Montana mi
shaft, planned to be sunk 200′.

GRIZZLY RIDGE MINING CO.

Office and mine: North Columbia, Nevada Co., Cal.
assaying 1.25% copper, 17 oz. silver and $40 gold per ton.

GRUTLI MINING CO.

Mine office: Eureka, Juab Co., Utah. John Bestel
manager; H. W. Horne, secretary. Organized circa Mar
of Utah. Lands, 7 claims, adjoining the East Tintic
north. Management plans developing by a 250′ shaft a
bottom.

COMPAÑÍA MINERA DE LA GUADALUPITA.

Mine office: Santa Engracia, Ciudad Victoria, Tama
ized under laws of México, with capitalization 25,000 pe

id to plan operating through subsidiary corporations, and controls the an Investment & Development Co., owning the Agua Blanca mine. rty includes the Calabaza mine, at Etzatlán, Jalisco, and the Dolores, stante, San Antonio de las Minas, San Gregorio and Sevillana mines, all state of Guanajuato, with a 40-ton mill on the Dolores property.

RNICA SILVER & COPPER MINES (BOLIVIA), LTD. **BOLIVIA.**

ffice: 4 Great George St., Westminster, London, S. W., Eng. Property sedly is in Bolivia.

L MINES, LTD. **BRITISH COLUMBIA.**

ead. Was succeeded, June 6, 1900, by Hall Mining Co., Ltd. Formerly elson, Kootenay district, B. C.

BURG-AMERICAN COPPER MINING & MILLING CO. **IDAHO.**

ffice: Kellogg, Idaho. Mine office: Wardner, Shoshone Co., Idaho. Schaefer, president; Louis Lincoln, vice-president; Louis Walden, secre- and treasurer; preceding officers, W. W. Papesh, Paul Jacobs and Fred- Bell, directors. Organized November, 1908, under laws of Idaho, with alization $1,500,000, shares $1 par. Lands, 8 claims, on the Little North on which development was begun early 1909.

NIBAL CONSOLIDATED MINING CO. **UTAH.**

ffice: Provo, Utah. Mine office: Silver City, Juab Co., Utah. John lmeyer, president; John M. Bestelmeyer, vice-president; H. C. Hicks, sec- y and treasurer. Organized circa September, 1909, under laws of Utah, capitalization $100,000, shares 10 cents par.

DSHELL-FLUX MINING & DEVELOPING CO. **ARIZONA.**

ffice: Tucson, Ariz. Mine office: Patagonia, Santa Cruz Co., Ariz. Heney, president; R. R. Richardson, vice-president; W. E. Francis, secre- and treasurer; Frederic John Siebert, consulting engineer; Francis J. y, counsel; J. C. Hartness, general manager. Lands, circa 30 claims, in the etto district, on the southerly slope of the Patagonia Mountains, 6 to 9 from Patagonia, including the Flux, Hardshell and Three R mines, formerly by Col. Wm. C. Greene, who was unable to meet the final payment. rty as a whole has about 800′ of workings. The Three R mine has tunnels gating about 400′ length, showing a large body of disseminated chalcopy- estimated to average 3 to 4% in copper tenor. Ore values, as a whole, ainly in silver, with some lead, copper and gold.

KLA COPPER SYNDICATE. **AUSTRALIA.**

Mine office: Irvinebank, Queensland, Australia. Wm. Swan, manager. rty, showing copper ore, was undergoing development, with a small force, t accounts.

LA CONSOLIDATED MINES CO. **WYOMING.**

ffice: 1624 Curtis St., Denver, Colo. Mine office: Hecla, Laramie Co., Henry Schwartz, president; A. E. Keller, secretary; Eli Miller, treasurer; ding officers, Henry Hirsch and Wm. L. Wilson, directors. Organized circa under laws of Wyoming, with capitalization $1,000,000, shares $1 par, as a er of the Hecla Mining Co., Amalgamated Copper Mining & Extraction Co. Kopper Krown Mining Co.

The Hecla group, 13 claims, 2 patented, and a 35-acre townsite, is in the Crown district, 4 miles from Granite Canon, on the Union Pacific rail- and 7 miles from the Cheyenne Northern line. This group is claimed to 16 fissure veins, of 8′ average width, in schist and granite, of which 3, average claimed width, are claimed to be under development, and are ed to carry oxidized and sulphide ores claimed to give average assays of opper, 3 oz. silver and $12 gold per ton, in addition to which they are ed to carry estimated values of $10 to $12 per ton in nickel, platinum and um, which values apparently are something more than doubtful. Develop- at last accounts, was by a 60′ tunnel and 14 pits and shafts, of 10′ to 140′

depth. The Hecla group made an ore shipment, previous to September, 1909, to the Boston & Colorado smelter, but the president reports company unable to continue production owing to lack of capital, but management hopes to have plenty of money soon.

The Teddy Roosevelt-Good Hope group, formerly held by the Amalgamated Copper Mining & Extraction Co., is either 10 claims, area 200 acres, or 11 claims, area 220 acres, in the Silver Crown district, 2 miles from the Union Pacific railway and 23 miles from Cheyenne, said to have about 700′ of workings, said to show ore giving fair assays in copper.

The Kopper Krown group, circa 2 miles southwest of Hecla and 22 miles west of Cheyenne, apparently is 7 claims, area 140 acres, and not 154 acres, as claimed by company, having 413′ of workings, claimed to show 10,000 tons of sulphide ore blocked out for stoping.

The Hecla mill, 80x100′ in size, has 15 stamps, a 50-ton concentrating plant and a leaching plant. The Ohly process was installed by the present management under a former organization, in an attempt to save the rare metals, but was not a success. Ore, which is mainly low in grade, is only in part adapted to concentration, and the mill requires overhauling and adaptation to the ore.

The management of the Hecla Mining Co. and the preceding corporations, which also had Mr. Schwartz as president and general manager, peddled "guaranteed" stock, claiming that 5% interest was guaranteed for 3 years on the stock investment by United States government bonds, but nobody seems to have seen the bonds. The old Kopper Krown Mining Co. advertised that it planned building a smelter, and was ready to ship on a moment's notice, but seems to have failed to receive the notice. Prospectus of the present company states that it is "one of the most substantial, conservative and successful mining organizations in the entire west," which is a rather remarkable claim, considering the history made in the past. Because of the bad record of preceding companies merged in this corporation, and operated formerly under the same management, this company is regarded with much suspicion.

HEFFERN MINING CO. ARIZONA.

Mine office: Courtland, Cochise Co., Ariz. Albert Heffern, president. Lands, 200 claims, in the Swisshelm Mountains, circa 25 miles south of Courtland and 20 miles north of Douglas. Property shows auriferous and argentiferous chalcopyrite, with occasional bornite, having quartz gangue, and carries some native gold. Development is by a 475′ two-compartment shaft. Equipment includes a 45-h. p. boiler and hoist. Employs circa 50 men, and is developing systematically, with fair prospects.

HENDERSON'S TRANSVAAL ESTATES. TRANSVAAL.

Mine office: Berkenrode, Zoutpansberg, Transvaal. Property is in the vicinity of the Messina mine, and development on a copper deposit was begun circa July, 1909.

HENRIETTA MINING & MILLING CO. COLORADO.

Office: Ernest & Cranmer Bldg., Denver, Colo. Mine office: Silverton, San Juan Co., Colo. E. C. Drew, president; Geo. H. Craft, secretary and general manager. Circa September, 1909, company bought, at sheriff's sale, the property of the San Juan Smelting & Refining Co.

Lands, circa 40 claims, 10 patented, including a millsite 1 mile below the Henrietta mine, in Prospect Basin, on the western side of Red Mountain, and in Picayune Gulch on Treasury Mountain, with some claims on Eureka Mountain, and 3 claims in Cinnamon Gulch, on the line of the Silverton, Gladstone & Northern railroad, 7 to 10 miles from Silverton. Part of the holdings were held under bond and lease by the Ross Mining & Milling Co. Principal property is the Henrietta mine, carrying auriferous and argentiferous copper ore, opened by a long crosscut tunnel, estimated, by the San Juan Smelting & Refining Co.,

ow circa 400,000 tons of ore of about $15 average value blocked out for action, which figures were much exaggerated. The Henrietta is said to occasional chutes of high grade smelting ores, up to 20 to 30% in cop- enor, with smelting ore averaging about 7% and milling ore about 3.5% in er tenor. Mine has 6,250′ of workings, including 4 tunnels, and manage- plans extending tunnel No. 10, the lowest, now 600′ long, to intersect the rietta vein at a distance of 1,200′ from the portal, with a back of about ′. No. 7 tunnel is about 2,200′ long. Property was idle for some years re purchase by present company.

Equipment includes gasoline and electric plants, latter taking current the Animas Power Co. A Trenton Iron Works aërial tram extends from railway siding to the portal of No. 7 tunnel.

CULES MINING CO. **BRITISH COLUMBIA.**

Mine office: Jedway, Queen Charlotte Island, B. C. Lands are in the nity of Awaya, Ikeda & Co., on Moresby Island. Presumably idle.

RMIDALE COPPER CO. **AUSTRALIA.**

Mine office: Hermidale, N. S. W., Australia. Organized circa August, , under laws of New South Wales, with capitalization £2,625, shares 1s. 6d. Company planned beginning prospecting, circa September, 1908.

SS-FARRIS MINERAL EXPLORATION CO. **MEXICO.**

Mine office: Chalchihuites, Sombrerete, Zacatecas, Mex. C. A. Phelps, erintendent. Property carries ores of copper and lead, and was working a small force at last accounts.

DALGO PLACER MINING CO. **MEXICO.**

Office: Washington, D. C. Mine office: Hidalgo del Parral, Chihuahua, c. Gen. L. T. Michener, president; J. Williams, superintendent. Property opper claims on the Conchos river, about 70 miles from Parral, said to show assaying up to 28% copper, at depth of 100′.

H GRADE SILVER & COPPER CO. **WASHINGTON.**

Mine office: Chewelah, Stevens Co., Wash. F. T. Hertzell, president and eral manager; L. E. Hertzell, vice-president; W. W. Dickson, secretary and asurer. Organized circa August, 1909. Property has a 110′ shaft, planned be deepened.

LDEBRAND & CO. **MEXICO.**

Office: Durango, Mex. Mine office: Bacis, San Dimas, Durango, Mex. perty is the Trinidad mine, at El Cobre, in the vicinity of Bacis, carrying iferous and argentiferous copper ore. Property has a 20-ton smelter, and tte is produced and shipped in small quantities.

LLSIDE CONSOLIDATED MINING CO. **ARIZONA.**

Office: Indianpolis, Ind. Mine office: Cherry, Yavapai Co., Ariz. John Tribby, Chas. W. Cheney and Chas. W. Green, directors. Organized circa ptember, 1909, under laws of Arizona, with capitalization $1,000,000, shares par. According to articles of association, 999,500 shares were to go to bby and his associates, in payment for the property, leaving $500 in stock the company's sole financial resources. Apparently company is a consolida- n of the Great Hillside Mining Co., Anabelle Mining Co. and Golden Idol ning Co. Lands, 19 claims in the Cherry Creek district. Presumably idle.

OLMWOOD COPPER CO. **AUSTRALIA.**

Mine office. Cowra, Bathurst Co., N. S. W., Australia. Lands, one-half le from a railway at Holmwood Station, and 5 miles northeast of Cowra, in e parish of Coota, show 4 copper veins in porphyry, with a 92′ shaft sunk rtically in the country rock to intercept the underlay. A vein of 12″ to 18″ dth contained bunches of ore assaying 8.22% copper, 3 dwts. 6 grains silver d 3 dwts. 6 grains gold per long ton. Production is reported at 60 long tons ore. Idle and apparently moribund.

HOMANZAN MINE.

Mine office: Adakaya-mura, Yatsuka-go owner and manager. The mine carries cop silver values. Equipment includes a 300-h. p. employs about 600 hands. Production, 1907,

HOPPER MINES CO.

Office: Prescott, Ariz. Mine office: C Stevens, president; S. S. Lindsay, vice-preside D. L. Williams, treasurer. Organized under tion $750,000, shares $1 par. Lands, 4 claims district, about 14 miles east of Cherry, with shows veins of 30″ and 5′, said to average copper, silver and gold values, with values ap Mine was idle several years until work was February, 1909, when a contract was let fo incline of 45°, planned to connect with old w a considerable amount of ore ready for stopi

HOPE MINING CO.

Office: Security Bldg., St. Louis, Mo. Co., Mont. Paul A. Fusz, general manager Property carries argentiferous copper ore, wi ment includes a steam plant, 10-stamp mill an

HORSESHOE BASIN MINING & DEVELOP

Mine office: Chelan, Chelan Co., Wash. lan. Company is driving a tunnel, jointly Mining Co., which should cut the main vein At distance of 830′ tunnel cut an 18′ blind ore assaying $27.75 per ton in combined coppe

HORST-POWELL COPPER MINING CO.

Office and mine: Kingston, Shoshone Co Mark Mendenhall, secretary. Capitalization 8 claims, 2 patented, and a millsite, on the L ment is by a blind shaft from a tunnel, show at surface, with slate footwall and quartzit gold and silver. Company was said, late 1908 19 to 25% copper. Equipment includes a buildings. Employs 6 men.

AKTIESELSKABET HOVIN KOBBERMINE

Office and mine: Hovin, Norway. Prop at Hovin and Gransherred, Norway. Presum

HOWARD MINING, MILLING & DEVELOP

Mine office: Salida, Chaffee Co., Colo. to Salida, has several shallow shafts, deepest

HUMBOLDT SMELTER MINES.

Office: Boston, Mass. Mine office: Richard J. Burton, president. Organized circ tion $750,000, shares $5 par. Lands, 4 claims, a water right. Presumably idle.

IDAHO LEAD-SILVER MINING CO.

Mine office: Osburn, Shoshone Co., Idaho. Lands carry argentiferous lead and copper gasoline engine and air-compressor. Was und at last accounts.

IMPERIAL COPPER MINING CO.

Mine office: Chewelah, Stevens Co., Wa

s stringers of copper ore, apparently improving with depth, and continuous opment is planned. Equipment includes a small power plant.

EPENDENCIA MINING & MILLING CO. **MEXICO.**

Dead. Was reorganized as Mascota Copper Co. Formerly at Ameca, co, Mex.

IANA MINING CO. **CALIFORNIA.**

Office: 40 Currier Bldg., Los Angeles, Cal. Mine office: Needles, San ardino Co., Cal. Presumably idle.

IANA MINING CO. **MICHIGAN.**

Office: 60 Congress St., Boston, Mass. Operating office: Houghton, Mich. office: Rockland, Ontonagon Co., Mich. Stephen R. Dow, president; n R. Bailey, secretary and treasurer; Richard M. Edwards, superintendent. nized circa August, 1909, under laws of Michigan, with capitalization 0,000, shares $25 par; issued, $2,000,000; paid in, $8 per share. Company 60,000 shares to owners of lands for its property, and offered 36,000 es, August, 1909, for public subscription, and is supposed to have started ness with $128,000 cash.

Lands, 1,200 acres, bought 1909, from Indiana Copper Co., northeast of the Copper Co. and north of the North Lake, in Sections 21, 27 and 28, T. 50 R. 37 W. Property was worked on a small scale, previous to burning of mill, 864, but old workings are inaccessible, and no work was done on the southern part of the tract, in the horizon of the Lake amygdaloidal bed, which pposed to be carried by the Indiana. Diamond drilling was begun, August, , the overburden proving comparatively light, and first hole was drilled to Eastern sandstone. Property considered promising.

IAN CHIEF CONSOLIDATED MINING CO. **UTAH.**

Mine office: Newhouse, Beaver Co., Utah. Andrew Cochrane, president; P. Quinn, secretary and treasurer; preceding officers, Wm. Gray and Louis rane, directors. Organized January, 1909, under laws of Utah, with capiation $150,000, shares 10 cents par.

ICATOR MINING CO. **WYOMING.**

Office: Encampment, Carbon Co., Wyo. Property, on French Creek, is excepting for annual assessment work.

LENOOK MINING CO. **ARIZONA.**

Mine office: Prescott, Yavapai Co., Ariz. F. J. Price, president; L. S. rman, vice-president; C. C. Frost, secretary and treasurer. Organized circa , under laws of Arizona, with capitalization $3,000,000, shares $1 par. Lands, ut 320 acres, 35 miles from a railroad, on the Verde River, in the Square k district of the Black Hills, including both gold and copper claims, with e promising values on the latter. The gold mine has a 275′ tunnel and the per mine has a 150′ shaft and tunnel. Company has secured ore assaying o 40% copper, with some gold and silver.

LAND COPPER CO. **ARIZONA.**

Office: Commerce Bldg., Kansas City, Mo. Mine office: Planet, Yuma Co., z. Lands, circa 40 claims, including 2 groups of about 15 claims each, in Bill Williams range, near the Bill Williams Fork River, with a millsite, eltersite and water rights.

LAND COPPER CO. **IDAHO.**

Mine office: Troy, Latah Co., Idaho. Lands, 8 claims, east of Troy, having out 1,000′ of tunnels, showing, at depth of 160′, a 20′ vein, mainly oxidized, th streaks of rich ore assaying up to 27% copper.

TERNATIONAL CONSOLIDATED COPPER CO. **MEXICO.**

Office: Liberal, Kans. Mine office: Hermosillo, Sonora, Mex. Geo. M. Kerr, sident; O. C. Armstrong, secretary and treasurer. Organized circa 1907, der laws of Arizona, with capitalization $1,000,000, and is protocolized under

he completed plant, about 7,000 tons of structural steel, and the finished s will cost about $2,500,000. The general plan followed is much similar to of the Washoe works, though on a materially smaller scale, and the works planned on the unit system, so that they can be enlarged, when required, inimum expenditures of time, labor and money. The works were planned ve an initial capacity of 2,000 to 2,500 tons daily, but apparently will start a capacity of about 1,250 tons per diem only. Much of the material from ld Utah Consolidated smelter was used in constructing the new plant. The leted works will include a sampling-mill, power-house, calcining building 32 McDougall roasters, blast-furnace building, reverberatory furnace build- machine-shop, smithy, etc., with a 350′ brick smoke-stack on a concrete dation. It is planned to blow in the smelter circa Feb. 1, 1910, and the any has a 10-year smelting contract for handling the ore of the Utah olidated, effective March 1, 1910.

Ore will be brought from the Utah Consolidated at Bingham Canyon by a line aerial tram, but the matter of boring a 3½-mile tunnel through the tain is being given tentative consideration.

Company controls the Tooele Valley Railroad Co., having a 7-mile line ecting with the San Pedro, Los Angeles & Salt Lake railroad, and survey been made for an 18-mile line to connect with the same railroad near eld, giving a maximum grade of 1½%.

The Raritan works, on New York harbor, completed 1899, and since en- d, is one of the largest and most modern copper refining plants in the l, including a smelter and a mammoth electrolytic refinery. The smelter furnace buildings, with two 100-ton furnaces casting anodes in iron moulds mechanical conveyor, and two 150-ton casting furnaces for wire-bars and es.

The electrolytic refinery includes 2 tankhouses and a power house, con- d by 3′ concrete tunnels, power consumption being about 3,000 kilowatts, works having a capacity of about 1,000,000 lbs. finished copper daily. No. the old and No. 2 the new tankhouse, latter completed circa 1907. No. 1 house has 1,600 tanks, each holding 21 anodes and 21 cathodes, of size 6″, using a current of 5,000 amperes, with a cross-sectional area of only 5 re inches in the busbars.

No. 2 tankhouse is 150x184′ in size, having concrete foundations, with steel e and brick walls, special acid-proof Berlin brick being used for the base- floor. Permanent equipment includes 1,870,000 lbs. of lead, of which ,000 lbs. are in tank linings, and 881,000 pounds of copper divided as fol- : copper cathode rods, 186,000 lbs.; stripping plates, 122,000 lbs.; busbars connections, 170,000 lbs.; leads, etc., 100,000 lbs.; lead anode rods, 300,000 No. 2 tankhouse has 3 bays, running lengthwise, with two 10-ton 3-motor ting cranes in each bay, equipped with special devices for handling an e tankful of anodes or cathodes at one load. No. 2 tankhouse has 3 ric circuits, running lengthwise, one in each bay, each circuit of 396 tanks g handled from the powerhouse by an electric generator. Current is 7,500 eres, giving a current density of 20 amperes per square foot. Main con- or has a cross-sectional area of 12¾″. There are 1,188 depositing tanks, nged in 108 nests of 11 cells each, electrode arrangement being on the ker system, tanks being lined with 6-lb. lead, containing 4% antimony. e also are special tanks for rinsing the cathodes, after removal from de- ting tanks, and tanks for scrubbing slimes from scrap anodes, latter amount- to about 13% by weight. The works have special shears for trimming ode loops, and a Morrow loop machine for attaching copper lugs to the ode starting-sheets. Anodes are 28x36″ and cathodes are 30x37″, each having 24 anodes and 25 cathodes, spaced on 4⅝″ centers, cathodes re-

VADÓR IRIZAR. MEXICO.
Office and mine: Charcas, Moctezuma, San Luis Potosí, Mex. Property
ie Cerro del Cobre mine, carrying auriferous and argentiferous copper ore.
r development by a shaft planned to cut the vein at depth.

N HEEL MINING CO. UTAH.
Office: Salt Lake City. Mine office: Eureka, Juab Co., Utah. J. A. Suy
president; R. N. Corey, secretary and treasurer. Organized circa Novem
1909, under laws of Utah, with capitalization $25,000, shares 5 cents par.

N KING CONSOLIDATED MINING CO. UTAH.
Mine office: Eureka, Juab Co., Utah. Col. C. E. Loose, general manager.
e has a 600′ shaft, and a 1,000′ tunnel planned to cut the vein at about
)′ from the portal, which possibly may be driven to an eventual length of
)′.

N MOUNTAIN MINING CO. BRITISH COLUMBIA.
Mine office: Jedway, Queen Charlotte Island, B. C. Property is on
esby Island of the Queen Charlotte group, in the vicinity of the mine of
ya, Ikeda & Co.

N SPRINGS MINING CO. IDAHO.
Dead. Lands sold, 1908, to Keystone Mining Co., for $10,000. Formerly at
ser, Washington Co., Idaho.

AND COPPER CO. MICHIGAN.
Office: Lyceum Bldg., Duluth, Minn. Operating office: Leopold Bldg.,
ghton, Mich. Thos. F. Cole, president; Geo. C. Stone, vice-president; Fred
Nichols, secretary; preceding officers, Geo. G. Barnum, F. W. Heimick,
d Ames, Sr., Oscar J. Larson, Henry Nolte and G. A. Tomlinson, directors;
. J. Maney, treasurer. Organized March 16, 1909, under laws of Michigan,
capitalization $1,000,000, shares $25 par; issued, $475,000, shares $6 paid.
Lands, circa 84,000 acres, including former holdings, 83,720 acres, of the
Royale Land Corporation, Ltd., and lands of the Island Mining Co., all on
island of Isle Royale, county of Isle Royale, Michigan. Holdings comprise
major portion of the area of this, the largest freshwater island of the globe.
siderable mining, of a rather desultory nature, has been done upon these
s at various periods in the past, and a limited production of copper secured
efrom. The Island Mining Co. and its predecessors did rather extensive
k on a conglomerate bed of the Keweenawan copper bearing belt, sinking
afts, one of which was said to be 1,000′ deep, with a fair showing at the
om of the mine, but work was suspended on this property in 1873. No
oratory or development work has been done on the island since 1892. Prop-
is idle, but is considered of great potential value.

GRACE MINING CO. IDAHO.
Mine office: Silver City, Owyhee Co., Idaho. Marcus White, superinten-
t. Property carries argentiferous copper ores. Equipment includes a small
m plant and a 5-stamp mill.

AYA MINE. JAPAN.
Mine office: Itsuke-mura, Kuma-gori, Higo, Japan. Kichibei Noda, owner
manager. Equipment includes a 75-h. p. steam installation. Forces were
hands in 1907, with production, that year, of 252,971 lbs. fine copper.

LISCO BLANCA COPPER CO. MEXICO.
Mine office: Caborca, Altar, Sonora, Mex. Property is about 9 miles west
Caborca, and, in February, 1909, it was said that an extensive machinery
ipment was to be installed.

Y GOULD MINING CO. WASHINGTON.
Mine office: Chewelah, Stevens Co., Wash. F. C. Bailey, superintendent.
perty is a copper prospect, under development with force of about 10 men
last accounts.

JERSEY BELL COPPER MINING CO.

Office: 147 Nassau St., New York, N. Y. M
Co., N. M. John D. Fisher, president; E. D. M
treasurer; R. J. Curry, secretary; J. T. Janes,
Sellers, foreman. Organized Aug. 19, 1908, und
italization $1,000,000. Annual meeting, second T

Lands, 9 claims, area 140 acres, in the Pinos
of 30′ estimated width, traceable 3,000′, carrying
rite and tetrahedrite, estimated by company to
value. Development is by 4 shafts, of 30′ to 90′

COMPAÑÍA MINERA DE JIMOLES.

Mine office: Torreón, Viesca, Coahuila, M
forma y Anexas claims, carrying auriferous and

JOHN WOOD MINING CO.

Mine office: Clinton, Missoula Co., Mont.
Property shows a 10′ vein on the North Point
good average assay value was opened, circa April

JOWELL GOLD & COPPER MINING CO.

Mine office: Sylvanite, Grant Co., N. M. Pr
shown fair assay values in gold and silver.

JULIA COPPER MINING SYNDICATE, LTD.

Office: Queen Anne's Chambers, London, S
Fregeneda, Salamanca, Spain. Maj.-Gen. E. H.
preceding officer, W. T. Raymond and B. H. Rol
secretary; T. H. Bower, consulting engineer; J.
ganized June 29, 1908, under laws of Great Brita
shares £1 par, in £5,000 of 6% participating pre
nary shares, fully issued, £7,500 fully paid and £
acres, known as the Julia mine, on which develo

KANGIARA MINES, LTD.

Mine office: Yass, N. S. W., Australia. C
Australia, with capitalization £50,000, shares 10
from Yass, have a 5′ vein, developed by shaft,
from 5 to 8% copper, 5 to 30% lead, 10 to 20 oz
per long ton. Production formerly was shipped
consignment, 50 tons of ore, was sent to the ne
1908, and the company was said, August, 1909, t
on the coast. Property considered of exceptiona

KARATOYA MINING CO.

Mine office: Okura-mura, Mogami-gori, Uze
power installation, employs an average of about
was 40,741 lbs. fine copper, 4,570,368 lbs. of copp
zinc ore, of the total value of 27,703 yen.

KELLOGG CONSOLIDATED MINING & MILL

Office and mine: Kellogg, Shoshone Co., Id
A. P. Hutton, secretary. Capitalization $1,000,
claims, near Kellogg, showing a 4′ vein in quart
carrying ore assaying about 2.5% copper, with tr

KENYON MINING CO.

Office: Salt Lake City, Utah. Mine office:
Galigher, president; H. B. Blades, vice-president
and treasurer; preceding officers, Arthur E. Law
and E. J. Howell, directors. Organized circa M
with capitalization $100,000, shares 10 cents par.
of the Tintic district.

'STONE COPPER CO.
Mine office: Johnson, Cochise Co., Ariz. W. W. Miller, president
manager. Lands, 16 claims, southwest of the United, developed
t in limestone, showing 10" of chalcocite assaying up to
:ations of good sulphide ore bodies at depth. Management
t to 200'.

'STONE MINING CO.
Office: Cannonsburg, Pa. Mine office: Weiser,
Caldwell, secretary and treasury. Lands were bought
, of the bankrupt Iron Springs Mining Co.

CORA MINING CO.
Office: Salt Lake City, Utah. Mine office: Newhouse,
Van Cott, president; A. H. Crabble, vice-president;
Organized March, 1909, under laws of Utah, with
es $1 par. Lands, 8 claims, near the Newhouse mines,
, developed by a 200' tunnel.

KEBY MINES.
Office: Carl Johansgade 23-IV, Christiania, Norway.
stiania, Norway. Olaf Sandaas, manager. Lands,
edal, show numerous parallel veins, with cross fissures,
galena, sphalerite and pyrite, with quartz gangue.

SUNEZUKA MINE.
Mine office: Ota-mura, Mine-gori, Nagato, Japan.
ager. Equipment includes a 40-h. p. steam plant.
hands. Production, 1907, was 111,129 lbs. fine copper.

TIMAC MINES CO.
Mine office: Silverton, San Juan Co., Colo. John T.
gold-copper ores. Equipment includes steam power
loys about 25 men.

GHT'S ISLAND COPPER MINING CO.
Office and mine: Valdez, Alaska. S. A.
s, in process of patenting, on Dryer Bay,
l surface showing, and has shown ore assaying
t includes a 200-h. p. hydraulic plant, furnishing

OB HILL GOLD MINING CO., LTD.
Dead. Was merged, March 29, 1901, in
& Power Co., Ltd. Formerly at Phoenix,

ÉTÉ ANONYME DES MINES DE CUIVRE
DE KUPFERBERG.
Office: Brussels, Belgium. Mine
s. Leys, comissaire. Organized
italization f6,000,000, shares f500
nerly owned by Gewerkschaft

SHTIM CORPORATION, LTD.
Office: 5 Fenchurch St., London
sia. C. F. H. Leslie, chairman;
cer, Baron Vladimir Meller-Z
ak, A. J. H. Smith, F. Stobart
y. Organized Oct. 29, 1908,
000,000, shares £1 par, fully
re capital, consisting of
ning Works, a corporation
ich Mr. Urquhart is
a first mortgage of £
n, Ltd., is owned by

Lands, circa 10,000 acres, mainly well wooded, near Lake Ladoga, carrying and copper ores. Mine, known as the Pitkäranta, opened circa 1820, was ed steadily until 1903, making an average annual production of about)00 lbs. fine copper during the last decade of operation, and was under the ership of the Russian Imperial Bank, which is practically the Russian rnment, from 1894 until taken over, 1908, by present company.

The property carries several ore bodies, but the one developed is a 15′ bed 'skarn,'' which is a granular mixture of augite, garnet and other ferro-nesian silicates, impregnated with chalcopyrite, in veinlets. This ore body, h dips to the south, at 40° to 50°, has been opened at intervals for a th of about 1½ miles. To the eastward the ore occurs as bunches, up to ral pounds in weight, and at this end of the workings the ore body is rated into 5 sections, the footwall bed, of about 70′ width, carrying finely eminated chalcopyrite in ''skarn,'' overlaid by a 2′ to 3′ layer of barren erial, followed in turn by 3′ of barren schist, succeeded by a cupriferous of about 20″ thickness, carrying somewhat argentiferous copper sulphides. company's lands also carry iron ore and are said to have indications of

The mine has a small smelter, and the company owns 3 steamers, known as Vulcan, Ludwig and Niemelin, and 10 barges. Property considered valu-

FORTUNA MINING CO. **MEXICO.**

Office: 315 Colorado Bldg., Washington, D. C. Mine office: Apartado 21, tlán, Oaxaca, Mex. C. E. Miller, president; Wm. H. Brown, first vice-sident; E. D. Stinson, second vice-president; Amos Tyree, secretary; Am-se Timberlake, treasurer; Wm. Nelson Brown, superintendent. Organized 6, under laws of South Dakota, with capitalization $250,000, shares $10 par. ds, 30 hectares, known as the Treadwell group, about 3 miles from Ocotlán one-half mile from the Oaxaca-Taviche branch of the Mexican Southern way. Property shows a well defined fissure vein of 2′ to 12′ width, stand-nearly vertically, cutting bedded andesite tuffs, and is greatly leached and dized to depth of 300′. Development is by a 400′ vertical shaft, with 600′ workings, and by two 100′ prospect shafts and 4 tunnels of 700′ aggregate gth. Workings show argentiferous chalcopyrite with quartz gangue, esti-ted by company to average 4.5% copper and 200 grams silver per metric . Some ore has been shipped returning 14% copper and 600 grams silver r metric ton. Company has been operating since 1906. Equipment includes 40-h. p. boiler, hoist and a small air-compressor for hammer drills. Property nsidered promising.

A GRACIA GOLD & COPPER CO. **ARIZONA.**

Mine office: Dewey, Yavapai Co., Ariz. Maj. T. C. Jordan, manager. nds, known as the Red Bluff group, held under bond, show ore giving assays to 20% copper, circa 15% nickel and 8% cobalt, with considerable anti-ony and arsenic. The ore is refractory and will require special treatment. mpany planned sending a carload of ore, late 1909, to New Jersey works r a thorough metallurgical test.

AKE SUPERIOR & SONORA DEVELOPMENT CO. **MEXICO.**

Office: Duluth, Minn. Mine office: Altar, Sonora, Mex. Employs circa men. C. S. Carpenter, president; Jas. Moran, vice-president; Odin Halden, cretary and treasurer; A. M. Hamfield, general manager; preceding officers, C. Alsted and Jas. Smith, directors. Organized 1909, with capitalization 00,000, shares $10 par. Lands are variously reported as 200 acres and as circa 00 acres. Property includes La Reina de Cobre mine, area circa 200 acres, out 7 miles east of El Plomo mine, in the foothills of the San Manuel Moun-ins, 30 miles northwest of Altar. Property is said to carry 6 well defined

ld. Equipment includes a hydro-electric power plant and air-compressor, roperty has a 100-ton concentrator.

RAL MINING CO. **UTAH.**

Dead. Was merged, 1903, in Butler-Liberal Consolidated Mining Co. erly at Bingham Canyon, Salt Lake Co., Utah.

GROUP MINING CO. **BRITISH COLUMBIA.**

Mine office: Jedway, Queen Charlotte Island, B. C. Property, on Moresby d of the Queen Charlotte group, is in the vicinity of Awaya, Ikeda & Co. mably idle.

MINING CO. **UTAH.**

Mine office: Eureka, Juab Co., Utah. Is controlled through ownership of hirds of stock issue, secured 1908, by Eureka Lily Mining Co.

T LODE MINING CO. **UTAH.**

Mine office: Bingham Canyon, Salt Lake Co., Utah. Chas. S. Jones, dent; W. J. Thomas, secretary and treasurer. Organized November, 1908, r laws of Utah, with capitalization $100,000, shares 10 cents par. Prop- is in the West Mountain district. Presumably idle.

LE BUTTE CONSOLIDATED MINES CO. **ARIZONA.**

Office: Phoenix, Ariz. Mine office: Bouse, Yuma Co., Ariz. Employs t 50 men. John W. Sharpe, president and general manager; David Shear, president; Homer B. King, secretary and treasurer; preceding officers, Geo. Halm and C. B. King, directors; Percy W. Sharpe, general manager; J. C. on, superintendent. Organized June 16, 1909, with capitalization 0,000, shares $1 par, as a reconstruction of the Little Butte Consolidated s Co., which was organized February, 1909, with capitalization $2,000,000, s $1 par.

Lands, in the Plomosa district, circa 4 miles northwest of Bouse, include Manipulator group of 9 claims, Sidetrack group of 6 claims, and an interest he Otis group of 20 claims, lying between the other holdings. Property s a vein of 6′ to 14′ reported width at surface, said to be wider at depth, ying considerable high grade ore, mainly chalcocite. The 272′ two-compart- t main shaft, on the Manipulator claim, has levels at 50′ and 120′, and e is a shallow incline shaft on the Little Butte claim. Equipment includes -h. p. hoist at the Little Butte shaft, which is to be deepened to 500′, and ld hoist at the new 2-compartment shaft being sunk 300′ east of the in- e shaft. Improvements include an assay office and 50-ton ore-bin, with a 0′ spur to the Arizona & California railway. Shipments, circa May, 1909, El Paso smelter, returned 13% copper and $9.70 gold per ton. Property sidered promising.

TLE CHIEF MINING & MILLING CO. **UTAH.**

Office and mine: Eureka, Juab Co., Utah. Jas. P. Driscoll, secretary. Is trolled, through ownership of majority of stock, by Chief Consolidated Min- Co., and is being absorbed by latter, through exchange of 1 share of Chief solidated for 3 shares of Little Chief, and is to be liquidated.

TLE MINT MINING CO. **MONTANA.**

Office: Wallace, Idaho. Mine office: Carter, Missoula Co., Mont. L. J. Jean, president; J. E. Gyde, secretary. Capitalization $1,500,000, shares par. Lands, 11 claims, 2½ miles from a railroad, showing 2 veins, of 25′ 30′ estimated average width on surface, carrying copper, silver and gold ues, associated with spathic iron. Has about 1,000′ of workings, with essary mine buildings, and, to end of 1908, had shipped 2 carloads of ore, urning about $30 per ton.

TTLE WONDER COPPER MINING CO. **AUSTRALIA.**

Mine office: Walcha, N. S. W., Australia. R. Rose, manager. Property s developing, with a small force, at last accounts.

fissure veins, in porphyry, giving ore assaying
per ton, and shows 2 principal veins, of which
done includes considerable trenching, and 2 s
include necessary mine buildings.

LAMPA MINING CO., LTD.

Office: 80 Drury Bldgs., Liverpool, Eng. M
Puno, Perú. J. Lionel Barber, chairman; prec
H. P. Gamon and G. M. Hampshire, directors; T
ber, consulting engineers. Organized June 30, 1
ain, with capitalization £35,000, shares £1 par;
£10,000 authorized; £5,130 issued. Accounts su
a loss of £3,256, with debit balance of £4,490.
the Santa Catalina, Rubi and other copper clain
Trapiche, and the water power of Toropujani, n

LANCELOT TIN MINES, LTD.

Office: 1 Bucklersbury, London, E. C., E
Cardwell Co., Queensland, Australia. A. Jack
ganized March 19, 1909, under laws of Great
£17,500, shares £1 par, as a reconstruction of L
Mines, Ltd., which was a reconstruction, 1903, o
Ltd. Lands, 60 acres freehold and 160 acres l
per, tin, bismuth and wolfram, opened by a 327'
Equipment includes a small concentrator. Pr
ducer of tin and bismuth only, the copper ores

LAS BOLAS MINING & SMELTING CO.

Office: St. Paul, Minn. Mine office: G
Mex. Presumably idle.

LAST CHANCE MINING CO.

Mine office: Brighton, Salt Lake Co., Ut
manager. Lands, 1 patented claim, adjoining th
Big Cottonwood district. Shaft, at depth of 70
silver-lead ore. Management planned, 1909, inst
ment.

LA VENTURA MINING & MILLING CO.

Mine office: Ocotlán, Oaxaca, Mex. Geo
carries auriferous and argentiferous copper ore,
plant.

LENA GOLD & COPPER MINING CO.

Office: Dover, Del. Mine office: Searchlig
Frank Allee, president. Property shows aurifer

LEON MINING CO.

Office: 100 Broadway, New York, N. Y. Mi
Galeana, Chihuahua, Mex. Geo. A. Laird, mana
intendent. Mine carries auriferous and argent
Equipment includes a steam plant and air-comp

LEONORA MINING & MILLING CO.

Office: Salt Lake City, Utah. Mine office
W. W. Horne, secretary. Mine has a 30' tunne
with a small force at last accounts.

LE ROI COPPER CO.

Mine office: Kingman, Mohave Co., Ariz.
Lands, slightly developed, are in the Enterpris

LEVIATHAN GOLD MINING CO.

Mine office: Pony, Madison Co., Mont. Cha
Property carries auriferous and argentiferous co

d. Equipment includes a hydro-electric power plant and air-compressor, roperty has a 100-ton concentrator.

RAL MINING CO. **UTAH.**

ead. Was merged, 1903, in Butler-Liberal Consolidated Mining Co. rly at Bingham Canyon, Salt Lake Co., Utah.

GROUP MINING CO. **BRITISH COLUMBIA.**

line office: Jedway, Queen Charlotte Island, B. C. Property, on Moresby of the Queen Charlotte group, is in the vicinity of Awaya, Ikeda & Co. nably idle.

MINING CO. **UTAH.**

line office: Eureka, Juab Co., Utah. Is controlled through ownership of irds of stock issue, secured 1908, by Eureka Lily Mining Co.

T LODE MINING CO. **UTAH.**

line office: Bingham Canyon, Salt Lake Co., Utah. Chas. S. Jones, ent; W. J. Thomas, secretary and treasurer. Organized November, 1908, laws of Utah, with capitalization $100,000, shares 10 cents par. Prop- s in the West Mountain district. Presumably idle.

LE BUTTE CONSOLIDATED MINES CO. **ARIZONA.**

ffice: Phoenix, Ariz. Mine office: Bouse, Yuma Co., Ariz. Employs 50 men. John W. Sharpe, president and general manager; David Shear, resident; Homer B. King, secretary and treasurer; preceding officers, Geo. lm and C. B. King, directors; Percy W. Sharpe, general manager; J. C. n, superintendent. Organized June 16, 1909, with capitalization ,000, shares $1 par, as a reconstruction of the Little Butte Consolidated Co., which was organized February, 1909, with capitalization $2,000,000, $1 par.

ands, in the Plomosa district, circa 4 miles northwest of Bouse, include anipulator group of 9 claims, Sidetrack group of 6 claims, and an interest Otis group of 20 claims, lying between the other holdings. Property a vein of 6′ to 14′ reported width at surface, said to be wider at depth, ng considerable high grade ore, mainly chalcocite. The 272′ two-compart- main shaft, on the Manipulator claim, has levels at 50′ and 120′, and is a shallow incline shaft on the Little Butte claim. Equipment includes . p. hoist at the Little Butte shaft, which is to be deepened to 500′, and l hoist at the new 2-compartment shaft being sunk 300′ east of the in- shaft. Improvements include an assay office and 50-ton ore-bin, with a spur to the Arizona & California railway. Shipments, circa May, 1909, Paso smelter, returned 13% copper and $9.70 gold per ton. Property ered promising.

LE CHIEF MINING & MILLING CO. **UTAH.**

ffice and mine: Eureka, Juab Co., Utah. Jas. P. Driscoll, secretary. Is lled, through ownership of majority of stock, by Chief Consolidated Min- ., and is being absorbed by latter, through exchange of 1 share of Chief idated for 3 shares of Little Chief, and is to be liquidated.

LE MINT MINING CO. **MONTANA.**

ffice: Wallace, Idaho. Mine office: Carter, Missoula Co., Mont. L. J. an, president; J. E. Gyde, secretary. Capitalization $1,500,000, shares . Lands, 11 claims, 2½ miles from a railroad, showing 2 veins, of 25′ estimated average width on surface, carrying copper, silver and gold , associated with spathic iron. Has about 1,000′ of workings, with ary mine buildings, and, to end of 1908, had shipped 2 carloads of ore, ing about $30 per ton.

LE WONDER COPPER MINING CO. **AUSTRALIA.**

line office: Walcha, N. S. W., Australia. R. Rose, manager. Property eveloping, with a small force, at last accounts.

old Lake, which are developing by tunnel, and some ore has been shipped rom surface workings.

ONDON METAL BANKING CO., LTD. **AUSTRALIA.**

Office: 18 Fenchurch St., London, E. C., Eng. Mine office: Gulf Creek, ia Barraba, N. S. W., Australia. Hector Stewart, general manager; W. A. Vaite, mine superintendent; Robt. Schloesser, consulting engineer. Lands, 150 res, held under a 20-year lease, in the Barraba district, showing schist and artzite of early Silurian age, altered through basic intrusions, and indurated y-slate of Carboniferous age, with dykes of serpentine. Property shows 3 rallel veins, all under development, of 2′, 6′ and 38′ estimated average width, ceable 350′, originally carrying melaconite, azurite and malachite, which ve been worked out, and carrying, at depth, chalcopyrite in a matrix of 50% rite, 15% silica, 5% lime and 7% alumina. Development is by shafts of ′ and 370′, with 6,400′ of workings, estimated to show 66,000 long tons of blocked out for stoping.

Equipment includes a 25-h. p. steam plant, with 10-h. p. hoist, good for ′. The smelter, connected by a half-mile ground-tram with the mine, is of tons daily capacity, having two 15-ton reverberatory furnaces, turning out tte of 35% copper tenor. Equipment includes a small sawmill. Mine is ved by the Sydney to Barraba railroad, 22 miles distant. Production, 1901, s 560 long tons fine copper, from 9,400 tons of ore smelted, and in 1906 was a 70 tons fine copper, made from 2,400 long tons of ore smelted. Was specting and developing at last accounts.

RETTA MINING CO. **CALIFORNIA.**

Big Pine, Inyo Co., Cal. Wm. Eva, manager. Is controlled, through stock nership, by Chas. M. Schwab and the Gail Borden Estate. Mine has a 400′ ft, showing a 40′ vein said to average 4% copper. Improvements include mithy and several small mine buildings.

S BRONCES MINING CO. **MEXICO.**

Office: Phoenix, Ariz. Mine office: Santa Bárbara, Hidalgo, Chihuahua, x. B. W. McCausland, president; R. D. McCausland, secretary and man- er; Roy Chapman, mine superintendent. Lands, 24 hectares, including Los onces, La Esperanza and Kruger mines, carrying copper, lead, silver and ld values, developed by a 300′ main shaft, planned to be sunk to 500′. Has 25-h. p. steam hoist.

ST GULCH UNITED MINES CO. **ARIZONA.**

Office: 333 Monadnock Bldg., Chicago, Ills. Mine office: Black Warrior, la Co., Ariz. Employs circa 20 men. Jerry T. Harrington, president and neral manager; Will A. Childs, vice-president; W. Espy Curtis, treasurer; il McMillan, secretary; preceding officers and Hon. Beecher Powell, directors. pitalization $2,000,000, shares $1 par. Lands, 280 acres, in 3 contiguous oups, about 20 miles northwest of Black Warrior. The Badger and Kellner oups carry principally gold values, and the Cedar Tree group carries gold, ver, lead and copper values. Property is said to show several veins of 7′ to ′ width, and was said, August, 1908, to have secured ore assaying up to 9% pper and $100 gold per ton. Development is by a 700′ tunnel, on an ore body id to show high grade gold values at surface. Equipment includes two 80-h. p. ater-tube boilers and a 150-h. p. Corliss engine. A small stamp-mill, ft by former owners, was dismantled, and company is said to be building a ew 10-stamp mill. A test shipment of 12 tons, circa September, 1909, to El aso smelter, netted $211.10.

OST PACKER MINING & SMELTING CO. **IDAHO.**

Office: 1204-37 Wall St., New York, N. Y. Mine office: Ivers, Custer Co., daho. John T. Clarke, treasurer and managing director. Organized 1907, un- er laws of Wyoming, with capitalization $3,000,000, shares $5 par, as a hold-

ing company to gradually acquire the out
Mining Co. Company also plans acquiring
LOUISIANA & ARIZONA MINING CO.

Mine office: Jerome, Yavapai Co., A
Lands, 20 miles south of Jerome, include t
a good surface showing.

LUCANIA TUNNEL & MINES CO.

Office: 205 Colburn Bldg., Denver, Col
Creek Co., Colo. John McColl, superinten
argentiferous lead and copper sulphides, an
plant and air-compressor. Was under dev
accounts.

COMPAÑÍA MINERA LA LUZ.

Mine office: Cuatro Ciénegas, Monclo
tares. Property is a small producer, and,
300 metric tons yearly of auriferous copper

MACK MINING CO.

Mine office: Sahuaripa, Sonora, Mex.
at Guadalupe, about 3 miles from La Bufa
tiferous copper ore, was undergoing devel
also has mineral lands in the state of Chih

J. J. MACTEAGUE.

Office and mine: Estación Symon, San
Property is La Felicidad mine, near the
slightly argentiferous copper ore. Emplo

MAGISTRAL-AMECA COPPER CO.

Office: Los Angeles, Cal. Mine office
H. L. Percy, president and treasurer; Jas.
eral manager; G. C. B. Robinson, secreta
Lyons, directors. Capitalization, $1,500,0
mine, 10 miles from Ameca, said to have b
erty carries ore said to run 5 to 9% copper
of ore in sight. Company was said, Octo
flotation process mill, at cost of $50,000, i
furnace, as planned previously. Managem
10-mile standard-gauge railway to Ameca.
Clark, who apparently is now out of it.

MAK COPPER MINING CO.

Mine office: Thermopolis, Frémont Co
italization $100,000. Lands are at the head
opolis. A carload of ore from surface wo
per ton in gold and copper values.

MANGAS DEVELOPMENT CO.

Office: 29 Hall Bldg., Houghton, Mic
N. M. Employs 25 men. Hon. Norman W
vice-president; Lloyd S. Linton, secretary;
officers and Geo. Kaseman, directors; Har
Organized Oct. 2, 1909, under laws of New
shares $5 par; issued, $325,000, in 15,000
$2.50 paid. The 15,000 full paid shares w
property, and the company has 35,000 sha
Calumet, registrar.

Lands, 53 claims, partly patented, are
owned in fee and partly held under option,
tion at Silver City, in the Burro Mountai

nes. Property includes the Porterfield group of 17 claims, area 340 acres, e Porterfield-Robinson group, Thompson group, Jackson group, Malachite oup, Lee group and 5 claims formerly held by the Azure Mining Co.

The properties show iron blossoms, carrying small quantities of copper bonates, and surface indications are almost identical with those at the rro Mountain and Chemung mines, where enormous bodies of low grade dis- inated chalcocite have been opened at depths of 400' to 600'. Property examined and reported upon favorably by J. Morgan Clements, who recom- ded churn drilling, and boring was begun 1909, holes being put down, kerboard fashion, at 200' intervals.

A railway to the district is now being constructed from Whitewater, on Santa Fé line, a distance of 14 miles. Management is good, and property nsidered decidedly promising, having an excellent chance of developing a e country-rock mine of sulphide ore.

NHATTAN COPPER & GOLD MINING CO. **NEVADA.**

Dead. Was absorbed June 10, 1907, by Nevada-Utah Mines & Smelter oration. Formerly at Pioche, Lincoln Co., Nev.

NVEL MINING CO. **CALIFORNIA.**

Mine office: Manvel, San Bernardino Co., Cal. Victor Marsh, manager. perty has a 150' shaft, on a vein reported to carry 10% copper. Presum- idle.

REQUITA DEVELOPMENT CO. **MEXICO.**

Office: La Cananea, Sonora, Mex. Mine office: Moctezuma, Sonora, Mex. pany is said to be allied to the Moctezuma-Arizpe Mining Co., and lands directly south of latter. Transportation is by a good wagon road to La anea. Sundry ore shipments, circa 1908, to La Cananea smelter, returned t $25 per ton. Presumably idle.

RTIN MINING & POWER CO. **COLORADO.**

Office: 318 Boston Bldg., Denver, Colo. Mine office: Eureka, San Juan Colo. Samuel G. Martin, general manager. Property is the Tom Moore p, formerly held by Tom Moore Consolidated Mining Co. and later by Tom re Gold Mining Co., latter organized circa 1907. At last accounts Dennis n of St. Paul was suing Mr. Martin for an accounting. Property carries ferous and argentiferous sulphides of lead, copper and zinc. Equipment udes a hydro-electric plant and a Leyner air-compressor.

RY VERNA MINING & MILLING CO. **COLORADO.**

Mine office: Frisco, Summit Co., Colo. H. T. McAllister, general manager. perty carries auriferous and argentiferous copper and lead ores. Equipment udes a small steam plant and a Leyner air-compressor. Was under develop- at with a small force at last accounts.

M. MATHEWS. **MEXICO.**

Office and mine: Etzatlán, Ahualulco, Jalisco, Mex. Lands, 220 hectares, luding the Cinco Minas, Casa Blanca, Palos Verdes, Palos Quemado and millo groups, and a number of miscellaneous claims. Development is by fts and tunnels, and mines are limited producers of ores carrying gold, sil- copper and lead values.

YFLOWER MINING CO. **ARIZONA.**

Mine office: Johnson, Cochise Co., Ariz. Mine shipped some ore, 1906. sumably idle.

OY MINING CO. **NORTH CAROLINA.**

Office: Oklahoma City, Okla. Mine office: Otto, Macon Co., N. C. Prop- originally was held under lease by an English syndicate that begun ex- tation about the outbreak of the American Civil War. Lands, 2½ miles Otto and 9 miles south of Franklin, include several adjacent tracts, with allow shafts, opened on a vein for a distance of about 500', showing sul-

OCTEZUMA COPPER CO. **ARIZONA.**

Mine office: Globe, Gila Co., Ariz. Was said, July, 1906, to have found ack sulphide ore at the bottom of a 160′ shaft. Presumably idle.

OCTEZUMA MINING CO. **MEXICO.**

Office: San Antonio, Tex. Mine office: Charcas, Moctezuma, San Luis otosí, Mex. Otto Wahrmund, president; A. L. Tuttle, general manager; C. H. offman, superintendent. Property shows chalcopyrite, estimated to average to 5% copper, with small silver values. At last accounts company was con- lering the advisability of building a concentrator.

OHOCHANG MINING SYNDICATE, LTD. **BURMAH.**

Office: 20 Copthall Ave., London, E. C., Eng. Mine office: Kijanksee, rthern Shan States, Burmah. C. A. Moreing, F. A. Govett, H. C. Hoover and Tilden Smith, directors; F. A. Grew, secretary; Bewick, Moreing & Co., nagers and consulting engineers. Organized March 2, 1909, under laws of at Britain, with capitalization £5,000, shares £1 par; issued, £3,557. Prop- r is prospecting licenses covering the Mohochang silver and lead mine, the ha copper mine near Kijanksee, in the Northern Shan States, and the ngaung silver-lead mine, 37 miles from Mandalay.

LLIE GROVES MINING & MILLING CO. **COLORADO.**

Office: 328 New York Life Bldg., Kansas City, Mo. Mine office: Parshall, nd Co., Colo. I. M. Horton, president; J. M. Percy, vice-president; J. N. h, secretary; W. H. Bousfield, treasurer; O. M. Groves, general manager; eding officers, F. M. Crews, I. H. Anthony and D. W. White, directors; rett F. Philips, general counsel. Organized March 4, 1909, under laws of orado, with capitalization $2,000,000, shares $1 par. Lands, 11 claims, atented, area 110 acres, and a 40-acre millsite, about 6 miles northwest of shall. Development is by 2 tunnels, on the vein, deepest planned to give a k of 2,300′. Vein is said by management to average 18′ in width, running wide as 30′ with a 6′ central streak carrying gray copper ore, with copper ins and copper sulphide on either side, and vein is said to be opened for a gth of 4,500′. Two mill tests, on ore taken from surface, returned 7.8% and % copper, but the company's circulars claim 72,000,000 tons of ore from the of the mountain to the tunnel level, which apparently is a typographical or for 7,200,000 tons, but nothing like even the smaller amount is proven, l apparently the management figured the full width of the vein, which is not of commercial grade, and figured on possibilities rather than on what has en proven. The company announced that a smelter was expected to be talled, early 1909, but apparently same failed to materialize. Is not regarded rorably.

ONARCH DEVELOPMENT CO. **ARIZONA.**

Mine office: Paradise, Cochise Co., Ariz. H. S. Chamberlain, president; K. Morrow, vice-president; F. S. Hayward, secretary; J. G. Sweeney, treas- r; preceding officers and J. C. Hancock, directors. Organized June, 1909, er laws of Arizona, with capitalization $1,000,000, shares $2 par. Lands, 10 ms, partly owned outright and partly held under bond and lease, including Morrow & Chamberlain group of 2 claims, having a 125′ vertical shaft.

NTANA CENTRAL MINING CO. **MONTANA.**

Mine office: Butte, Silver Bow Co., Mont. Property is the mineral rights the Black Placer claim, adjoining the Davis-Daly, located in the business ion of Butte. Property was in litigation for 30 years, until 1909.

NTANA-CLINTON COPPER CO. **MONTANA.**

Office: First National Bank Bldg., Laurium, Mich. Mine office: Elliston, well Co., Mont. Capt. Wesley Clark, president; Thos. Bastian, vice-presi- t; Michael E. O'Brien, secretary; Alex. Levine, treasurer; preceding officers, as. Kendall, Jas. Rowe, M. J. Harrington, Jos. Strobel and Chas. L. Fried-

sunk to 500', with crosscutting from the bottom, this shaft having about 0' of crosscuts and drifts, July, 1909, a crosscut from the shaft being said show an 18' vein carrying hanging-wall and footwall paystreaks of bornite d chalcopyrite, assaying about 4% copper, 8 oz. silver and 40 cents gold per n, with occasional assays up to 12% copper, 34 oz. silver and 60 cents gold r ton. The shaft has a 40' gallows frame. Equipment includes two 60-h. p. ilers, a 15-h. p. hoist and a 5-drill electric air-compressor, taking current from e Missouri River Power Co. Was idle, late 1909, but it was stated that erations were to be resumed, company having been financed.

ONTANA MINING CO. **UTAH.**

Office: Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. John undy, president and general manager; Ernest R. Woolley, vice-president; d R. Woolley, secretary and treasurer; preceding officers, Duncan McVichie, C. Jensen and E. J. Raddatz, directors. Organized circa May, 1909, under s of Utah, with capitalization $250,000, shares 25 cents par. Lands are in vicinity of the Lily mine, and a 3-compartment shaft was begun, April, . Company was said, June, 1909, to have contracted for a complete electric ing equipment, including an 8x10" hoist, 125-h. p. air-compressor, and ric drills.

NTANA OREWAY MINING CO. **MONTANA.**

Mine office: Wisdom, Beaverhead Co., Mont. Lands are the Straight Tip p, in the Big Hole Basin, showing no ore on surface. Development is ned by a 1,500' tunnel to give an 800' back.

RESBY ISLAND MINING CO. **BRITISH COLUMBIA.**

Mine office: Jedway, Queen Charlotte Island, B. C. Property is on Moresby nd of the Queen Charlotte group. Presumably idle.

LLOS MOSER. **MEXICO.**

Office: Apartado 103, Monterey, N. L., Mex. Mine office: Cuatro Ciénegas, clova, Coahuila, Mex. Is an extensive operator of silver mines, also a zinc ducer. Property includes Santo Tomás mine, area 16 hectares, developed by 0-meter tunnel and a 50-meter shaft, producing copper carbonates with a e of 40 men, also Las Boquillas del Carmen mine, area 200 hectares, devel- d by 6 tunnels, of 900 meters aggregate length, producing carbonate and hide ores of copper, lead and zinc, with some silver, employing about 120 .

UNTAIN QUEEN MINING & MILLING CO. **COLORADO.**

Office: Victoria, Colo. Mine office: Animas Forks, San Juan Co., Colo. derick V. Bodfish, general manager. Property carries auriferous and argen- rous sulphides of lead, copper and zinc. Equipment includes an electric nt and air-compressor.

UNT BAKER GOLD, COPPER & TIN CO. **WASHINGTON.**

Mine office: Glacier, Whatcom Co., Wash. Lands, 22 claims, in 4 groups, hin a radius of 12 miles. The White Swan group, 10 miles from Glacier, ws a 5' vein, traceable circa 1,500', carrying gold and silver ore, with quartz gue, giving assay values of $4 to $35 per ton.

UNT BALFOUR COPPER MINES, LTD. **TASMANIA.**

Office: 31 Queen St., Melbourne, Australia. Mine office: Mt. Balfour, Tas- ia. A. E. Langford, chairman; Dr. B. P. Ekberg, consulting engineer. ds, on Mount Balfour, are reached by launch from Launceston and by horse- k from Zeehan and Waratah. Country rock is laminated sandstone, in es interbedded with slate, and on the eastern side of the property is a belt lack slate, carrying some large quartz veins, up to 50' in width, traceable eral miles. Principal vein, carried for 5,000' on the company's lands, is eloped by a 91' shaft, all in copper ore, with some drifting, and by shallow face trenches showing 3' to 10' of ore carrying melaconite and chalcopyrite,

EDLES EYE COPPER CO. **CALIFORNIA.**

Office: Los Angeles, Cal. Mine office: Needles, San Bernardino Co., Cal. n G. Burgess, W. A. Gordon, Alfred W. Allen, W. A. Smith and E. A. son, directors. Organized circa October, 1909, with capitalization $1,000,000.

LLIE S. COPPER MINING & MILLING CO. **WASHINGTON.**

Mine office: Republic, Ferry Co., Wash. Mine has about 800′ of workings, h about 100 tons of ore ready for shipment. At last accounts company was a bad way financially, and planned reorganization.

VADA-ARIZONA COPPER CO. **ARIZONA.**

Mine office: Hillside, Yavapai Co., Ariz. Jos. L. Giroux, president. Lands, ght 1909, of the Copper Queen Development Co., include water rights on ro and Copper Creeks, 30 miles north of Hillside, which management plans izing for electric power. Equipment includes a 50-h. p. hoist. Property s being prospected with churn drills, August, 1909.

VADA BUCKSKIN COMBINATION MINING CO. **NEVADA.**

Mine office: Buckskin, Douglas Co., Nev. J. W. Green, superintendent. perty carries auriferous copper ore, and equipment includes gasoline power.

VADA COPPER HILLS MINING CO. **NEVADA.**

Office: Mansfield, Ohio. Mine office: Luning, Esmeralda Co., Nev. Hon. S. Bricker, president; Dr. A. H. McCullough, vice-president; Dr. F. J. Foster, retary and treasurer; preceding officers, Bernard Eastman, Chas. Ritter and s. E. Fish, directors; Rowland Lea, mine manager. Organized under laws Nevada with capitalization $1,500,000, shares $1 par. Lands, 6 claims, area acres, in the Fitting district, circa 9 miles north of Luning. Company ims possession of 65 veins of ore, ranging from 6″ to 14′ in width, which ms almost too good to be true. Property is developed by opencuts, trenches a 200′ crosscut tunnel, and has secured ore giving assay values in copper, er and gold. Company's prospectus states that at the present time there ufficient work under construction, requiring copper, to consume the entire ut of all the copper mines in the world for the next 20 years, which would mportant, if true, and also states that no copper mine having a true geo- cal formation and well defined copper veins ever has become exhausted or ked out, which also would be important, if true.

VADA MINING CO. **CALIFORNIA.**

Mine office: Auburn, Placer Co., Cal. L. G. Schuster, manager. Lands, 150 s, in Placer County and 30 acres in Nevada County, former 8 miles from rest railroad, at Auburn, with a good wagon road connecting. Development y 2 shallow 2-compartment incline shafts, in a vein reported as diorite in e, carrying malachite and chalcopyrite, associated with pyrite and hematite, apparently auriferous. Buildings include a smithy and boarding house.

VADA-PACIFIC COPPER CO. **NEVADA.**

Office: 40 Exchange Place, New York, N. Y. Mine office: Luning, meralda Co., Nev. Samuel I. Silverman, manager; preceding officer, L. L. rick, A. E. Spriggs, J. H. Miller and C. H. Palmer, directors. Organized a 1909, with capitalization $3,000,000, shares $5 par, in $500,000 of 6% ferred stock and $2,500,000 common stock. Lands, in the Luning district, said to be extensive, and company was said, August, 1909, to have taken option on the Mayflower group of the Copper King Mining & Smelting Co. Silverman is variously quoted in the press as claiming to have in sight ,000 to 1,000,000 tons of ore assaying 5.5% copper, with combined gold and er values of about $1 per ton, and also is quoted as claiming that the com- y could produce copper for 7 cents per pound, which remains to be demon- ted. Company plans erecting a custom smelter on the Southern Pacific way, in the Walker Lake district, and it was stated in the press, July, 1909,

diamond drilling, with a view to locating the northern extension of the ltic amygdaloidal bed on the eastern part of the property. Management is od, and property is considered a prospect of exceptional value, by reason of great landed area on the mineral zone, and the likelihood of finding a pay- le amygdaloidal bed near the Eastern sandstone.

EW BALTIC EXPLORATION. **MICHIGAN.**

Office and mine: Shelden Bldg., Houghton, Houghton Co., Mich. Jas. P. wards, general manager. Was organized circa December, 1908, with capi- ization $20,000, shares $2 par, fully paid, but is not incorporated. Plans of nagement call for the incorporation of the New Baltic Copper Co., under the ws of Michigan, with capitalization $2,500,000, shares $25 par, and it is anned to issue one share of stock in the mining company for each share of ock in the development pool, and to give shareholders of development stock ghts to subscribe to additional stock, 3 shares for 1, at whatever subscription ice the new company may be floated at.

Lands in Section 16, east of the Arcadian, are held under option from rious owners, and an undivided quarter interest owned by the New Arcadian pper Co. is held under a $40,000 option, and it is probable that the New eadian Copper Co. will take stock in the New Baltic Copper Co., to be ganized, in payment for this amount.

Work includes considerable trenching, and holes bored with a Calyx drill, ich had considerable trouble in getting down standpipes. No. 3 borehole, at pth of 330′, cut 2′ of exceptionally good copper bearing rock, with 6″ of avy copper, and in September, 1909, a drill-core was taken from what was ought to be the western bed of the Baltic, fairly charged with copper, at pth of 300′. In November, 1909, a drill hole, pitched at an angle of 60°, cut rough an amygdaloidal bed, estimated also to pitch at 60°, in opposition, gave es of 105′ aggregate length, showing copper at various points, with the final carrying much fine stamp copper, and a considerable amount of very coarse mp copper, the bed giving every indication, from this drill hole, of carrying kable values if developed. Property considered decidedly promising.

W CONSOLIDATED MINING CO., LTD. **MEXICO.**

Dead. Was reconstructed, June 10, 1909, as Consolidated Copper Co., Ltd. nerly at Charcas, Moctezuma, San Luis Potosí, Mex.

W DOMINION COPPER CO. **BRITISH COLUMBIA.**

Office: 42 Broadway, New York, N. Y. Mine office: Phoenix, Boundary rict, B. C. Works office: Boundary Falls, Boundary district, B. C. J. A. isohn, president; Newman Erb, vice-president; Theo. Herrmann, secretary; us H. Susmann, treasurer; preceding officers, Hon. Warren W. Foster, F. L. mer, N. Bruce McKelvie and John A. Sleicher, directors; John Seward, erintendent; J. Parke Channing, consulting engineer.

Organized June 9, 1909, under laws of British Columbia, with capitalization 50,000, shares $5 par, fully issued and fully paid. Bonds, $500,000, at 6%, 10 years, convertible into stock at par. Windsor Trust Co., New York, nsfer agent. Annual meeting, first Monday in June.

Company is a reconstruction of the Dominion Copper Co., Ltd., which aulted on bond interest, June, 1908, and for which a receiver was appointed . 2, 1908, on application of the mortgage trustee. Property of the old com- y was bid in at mortgage sale, June, 1909, for $261,500, by Col. Chas. yden, chairman of the reorganization committee, and property of old com- y was turned over to the new corporation, August, 1909. The plan of rganization was extremely drastic, and there were many bitter complaints m dissenting holders of stocks and bonds of the old company. A protective mmittee of dissenting shareholders has been appointed, with B. W. Lincoln chairman, and this committee is to investigate the legal rights of the old

y low values in copper, about 1 oz. silver and up to $7.50 gold per ton, but ected to carry somewhat better copper values below the oxidized zone.

Property in the Summit camp includes a half interest in the Lancashire e, having a silver vein, and a three-fourths interest in the Mountain Rose e, with combined area of 74 acres, carrying fluxing ores. The Mountain e, owned one-fourth by the Hall Mining & Smelting Co., has 2 tunnels, aing a vein of about 15′ width, and produced 3,999 tons of fluxing ore in

Power for the mine and works is mainly electric, current being furnished he South Kootenay Power Co., from Bonnington Falls, circa 25 miles dis- . The Phoenix group has electric hoists and a 25-drill Canadian Rand air- pressor, driven by a 450-h. p. Canadian Westinghouse electric motor. The est crusher is a Jenckes-Farrel-Bacon, with 42x30″ jaw openings, weighing a 125,000 lbs., with an hourly capacity of 150 tons of ore reduced to 6″ size, g one of the largest ever built.

Ore is transported 4 to 25 miles by rail from the various mines to the lter. The matter of building a 5-mile aërial tram to cost circa $100,000 was n tentative consideration by the former owners, but financial considera- s precluded its construction. Rail freights are 17 cents per ton on Dead- d ore, and 30 cents per ton on ore from the Phoenix and Summit camps.

he 1,500-ton smelter, 4 miles from Greenwood, was built by the Standard itic Co., passing later to the Montreal & Boston Consolidated Mining & elting Co., Ltd., thence to the Dominion Copper Co., Ltd. The smelter was rly equipped and poorly located, but was overhauled and modernized by the minion company, and lands were added for slag storage.

The works include a small sampling mill, equipped with crushers, rolls, -conveyors and Vezin and Bridgeman automatic samplers.

The 120x182′ blast-furnace building has, in the building, sixteen 10x25′ ore- s, and there are 3 large ore and coke-bins outside, with railroad tracks run- g above. There are two 325-ton water-jacket blast-furnaces, 40x176″ at the eres, and one 600-ton 44x255″ furnace, all having automatic feed. The dust- , 200′ long, has a 30x50′ brick dust-chamber, and leads to a stack 112′ high 9′ 6″ in diameter, and a self-supporting stack 100′ high and 8′ in diameter. g is handled by a 7x12″ locomotive, on a 40″ gauge railroad track.

The power plant at the works includes No. 7 Connersville blowers and a -light dynamo. The old machinery plant, burned 1908, was rebuilt. The rks include a machine-shop.

When operated the smelter works three 8-hour shifts, product being a tte carrying about 45% copper, 13 oz. silver and 3 oz. gold per ton, shipped the British Columbia smelter at Greenwood for refining. The smelter also es custom work when in blast.

Production, for year ending July 31, 1907, was 187,981 tons of ore, yielding 10,695 lbs. fine copper, 42,606 oz. silver and 10,321 oz. gold, realizing 20,184.84, with total operating expenses of $740,002.72, giving a net mining ofit of $80,942.91. The former company's financial statement showed a profit, perations for 18 months ending July 31, 1906, of $139,144. Production for year ing July 31, 1907, averaged 15.5 lbs. fine copper, 0.5 oz. silver and $1.10 gold ton, and the management was said to have secured costs of $1.34 per ton mining, including freight, and $1.32 for smelting, or total mining and smelt- costs of $2.66 per ton. Allowing 34 cents miscellaneous expenses, the cost ld be $3 per ton on ore reduced to matte, to which should be added 40 to ents per ton for conversion, refining, smelting and miscellaneous expenses, ng total costs of about $3.50 per ton on ore, exclusive of interest on bonded btedness. Deducting therefrom $1.40 per ton for included gold and silver es, cost of copper contained in a ton of ore, amounting to 15.5 lbs., would

be $2.10, or 13.5 cents per pound, instead of the alleged cost of 8 cents per pound that was claimed by the management of the old company. These figures, reprinted from Vol. VIII, show why the Dominion Copper Co., Ltd., came to grief.

Matte of the New Dominion smelter was converted, when the property was operated, at the British Columbia works, and it is probable that the New Dominion will contract with the British Columbia for smelting its ores at the Greenwood smelter of the former, suspending operations at the Boundary Falls works. The new company planned resuming mining and smelting in August, 1909, but was idle at last accounts, though with prospects of resumption shortly. The property is dangerously low in grade, but has enormous ore bodies, and, under the present strong management, and especially if operated in close working alliance with the British Columbia, should become a large producer eventually.

NEW DOMINION COPPER MINING & DEVELOPING CO. WASHINGTON.

Mine office: Chewelah, Stevens Co., Wash. Lands are the Enterprise group of 4 claims, 3 miles east of Chewelah, adjoining the Copper King and United mines, developed by a 100′ shaft, showing an ore body, widening with depth, from which assays of $75 to $200 per ton have been secured in silver and copper.

NEW ENGLAND & ARIZONA GOLD & COPPER MINING CO. ARIZONA.

Office: 235 Main St., Lewiston, Me. Mine office: Humboldt, Yavapai Co., Ariz. Geo. A. Whitney, president; Lewis Harlow, treasurer. Organized 1906, with capitalization $750,000, shares $1 par. Company was short of cash at last accounts. Lands, 9 claims, 3 patented, circa 2 miles from Humboldt. Mine is developed to depth of 400′, showing ore giving gross assay values of $1.22 to $68.56 per ton.

NEW KEYSTONE COPPER CO. ARIZONA.

Office: 42 Broadway, New York, N. Y. Mine office: Miami, Gila Co., Ariz. Employs circa 50 men. Samuel A. Lewisohn, president; J. Parke Channing, vice-president; Julius H. Susmann, secretary and treasurer; preceding officers, Adolph Lewisohn, Walter Rosen, Jacob Langeloth, Theo. I. Herrmann, Ralph S. Lupton and Herman Cook, directors; Geo. C. Lawton, superintendent; H. Britton Gottsberger, general manager; Louis Wright, consulting engineer.

Organized circa August, 1909, under laws of Delaware, with capitalization $3,000,000, shares $5 par; issued, $1,500,000. Company was organized as a reconstruction of the Keystone Copper Co., shareholders of old corporation taking stock in new company in exchange for the property. Is controlled by the General Development Co., which also is in control of the Miami.

Lands, 12 claims, area 240 acres, lying next east of the Live Oak and near the Inspiration and Miami mines. Property shows granite and quartz-porphyry, with occasional schists. East of the main workings there are surface deposits of chrysocolla, said to assay 3 to 7% copper, and a conglomerate bed of 4′ to 12′ thickness, said to be impregnated with copper to the extent of 3 to 6%, from which values apparently could be recovered by leaching. Ore, as developed, is mainly chrysocolla, with disseminated carbonates and occasional sulphides, latter including chalcocite of 40 to 60% copper tenor. Principal ore body is a 12′ vein carrying a 15″ paystreak said to average circa 22% copper and 2 to 5 oz. silver per ton, balance of vein carrying concentrating ore of 3 to 5% copper tenor, which has been left standing, for later extraction.

Development by former owners included 3 tunnels, with about one-half mile of workings. No. 2 tunnel, of 570′ length, shows chrysocolla and carbonate ores of 4 to 24% tenor, and No. 3 tunnel, circa 600′ long, shows somewhat similar ore. Development by present management is along different lines, with a view to making a mine from disseminated sulphides in the Pinal schist. The

3-compartment Keystone shaft was 350′ deep August, 1907, with cross-ting and drifting in progress on the 150′ level. Work is planned to block out in squares of 200′, with levels at 100′ intervals. The new work shows dis-inated sulphides in Pinal schist, similar to those of the Miami, but appar-ly somewhat lower in grade, being about 2.5% in copper tenor, with some carrying up to 3% copper. In addition to underground work, prospecting n progress by two No. 5 Keystone churn drills, boring to depth of 400′ to ′, making an average progress of 15′ daily.

Equipment includes a 25-h. p. gasoline hoist and a 3-drill air-compressor, a 25-ton experimental plant, built 1905, using a modification of the epfner sulphide process, for leaching chrysocolla, carbonate ores and roasted phides. By this process ore is reduced to fines, pulped and leached for 3 rs in a slowly revolving chlorination barrel. The leaching solution is cupric oride, which is changed to cuprous chloride by the absorption of one atom of per. The enriched solution goes to precipitation tanks, where the extra ecule of copper is precipitated upon large copper sheets, and the solution, s regenerated to cupric chloride, is returned to the storage tank for further . The mill does not seem to have proven a success.

The Keystone has been a small producer since 1899, shipping ores giving elter returns of 22 to 27% copper, in addition to yielding low grade silicious s of 3 to 5% copper tenor, used at Old Dominion smelter for converter lin-gs. Production, 1907, was 208,801 lbs. fine copper. Management is good and perty considered decidedly promising.

EW MONARCH MINING CO. **COLORADO.**

Office: 310 Cuyahoga Bldg., Cleveland, Ohio. Mine office: Leadville, Lake ., Colo. Jas. B. McDonald, manager; Frank Fuller, superintendent. Property ries auriferous and argentiferous copper, lead and zinc sulphides. Equip-nt includes steam power and an air-compressor. Employs circa 50 men.

EW PLANET COPPER MINING CO. **ARIZONA.**

Office: 42 Broadway, New York, N. Y. Mine office: Planet, Yuma Co., Ariz. as. S. Barton, president; Wm. G. Nickerson, vice-president; O. J. Ashman, retary; Julius H. Susmann, treasurer; preceding officers, S. S. Rosenstamm d Alexander Rae, directors; Samuel Untermeyer, general counsel; J. Parke anning, consulting engineer; W. E. Upham, superintendent. Organized circa y, 1909, under laws of Delaware, with capitalization $4,000,000, shares $5 par, a reconstruction of the Planet Copper Mining Co. Stock in old company was ired by exchange of 240,000 shares of New Planet stock, 560,000 shares going the General Development Co., which is in control and will finance the prop-y. Company is said to have a guarantee fund of $1,000,000 for development.

Lands, 34 claims, area circa 650 acres, also 40 acres in millsites, in the rcúvar district, on the south side of Bill Williams Fork river, 12 miles east the Colorado river. Property shows about 50 exposures of ore, with 2 ore ies, apparently metamorphic contact deposits, having diorite on the footwall, erlaid by sedimentary shales and impure limestone, much altered by inter-ated eruptives, the veins, which carry a heavy iron capping, mainly of hema-e, for a distance of 3,000′, ranging up to 200′ in width, with average width of out 30′. Apparently the gossan is of workable grade, and it is estimated that property shows about 500,000 tons of 60% iron ore. The main ore zone, ceable about 2,700′, ranges up to 300′ in width, carrying oxidized and silicate s estimated to average 7 to 8% copper and 50 cents gold per ton, with traces silver, but apparently the workable portion of the vein is 3′ to 20′ in width. e vein is very flat, dipping about 15° only.

Development is by 3 incline shafts, deepest 800′, giving a vertical depth of 5′, showing ore of 5 to 12% copper tenor, with 12 vertical pits and shafts, of to 325′ depth, and 8 tunnels, longest 225′, with total workings of 0,000′,

about $300,000, mainly to the very worst poss
holdings are of slight area and questionable v
press announces that work will be resumed, imr
most unfavorably, and everybody connected wi
with a smirched reputation, while some of the p
selves as extremely lucky in having escaped ja

NORTH COLORADO MINING CO.

Office: Provo, Utah. Mine office: Eureka,
president; Hyrum Straw, vice-president; Heber
preceding officers, Perry Fuller and John Rou
May, 1909, under laws of Utah, with capitaliza
Lands are in the North Tintic district.

NORTH CROWN LYELL MINING CO., N. L

Office: 90 Queen St., Melbourne, Austr
Montagu Co., Tasmania. G. A. Lawson, ma
shares £1 par. Lands, 66 acres. Idle and appa

NORTH GEMINI MINING CO.

Mine office: Eureka, Juab Co., Utah. Lar
bond, 1909, to North Beck Mining Co.

NORTH MOUNT LYELL MINING CO., N. L.

Dead. Was succeeded, Sept. 20, 1907, by
Ltd. Formerly at Mt. Lyell, Montagu Co., Tas

NORTHERN ANNIVERSARY COPPER CO.,

Mine office: Gympie, Queensland, Australi
6s. 3d. par. Presumably idle.

NORTHERN LIGHT DEVELOPMENT MINI

Mine office: Latouche, Alaska. Organized
ington, with capitalization $1,000,000, shares $
island in Prince William Sound, opposite Lato
by tunnels, with about 250' of workings. A bl
cut, shows 6' of auriferous and argentiferous ch
sary mine buildings.

NORTHERN TEXADA MINES, LTD.

Office: Vancouver, B. C. Mine office: Va
S. G. Faulkner, president. Property is the Corn
which caved in, and a 550' main shaft, showing
ing 8% copper, 2.5 oz. silver and $1 gold per to
plant, hoist and 5-drill Rand air-compressor. E
ore to the Ladysmith smelter.

NORTHWEST COEUR D'ALENE ITALIC CO & DEVELOPMENT CO.

Office: Spokane, Wash. Mine office: Priest
Golden, president and general manager; Wm. K
Lands, 3 claims, showing a 20' iron gossan carr
magnetite, giving assay values of circa $2.50 pe
Development is by a tunnel, started March, 19(
give a back of 150'. Property has mixed rive
Panhandle smelter.

NOTRE DAME COPPER CO.

Office: Braddock, Pa. Mine office: Twillin
distance south of the holdings of the Great No
ment is in practically the same.

OARASAWA MINE.

Mine office: Iwate, Sendai, Japan. Tatsug
ploying 139 hands, without power equipment, p

RIQUEZ. **MEXICO.**
partado 65, Oaxaca, Oax., Mex. Mine office: Ocotlán, Oaxaca, Mex.
, general manager; Porfirio B. Enriquez, superintendent. Lands,
well watered and timbered, said to be 23 leagues from Ocotlán,
Alfirez, La Morena, La Soledad and El Fresno mines, carrying ores
lver, copper and lead values. About 75 men were employed, at
, and a small matting furnace was planned.

IN COPPER CO. **UTAH.**
11 First National Bank Bldg., Ogden, Utah. Mine office: Lucin,
o., Utah. E. A. Stratford, secretary and treasurer. Presumably

S CO. **ARIZONA.**
ice: Poland, Yavapai Co., Ariz. Company bought, January, 1909,
the Jessie Mines Co., including 14 lode claims and 160 acres of
on the Agua Fria river, 6 miles from the mine, which was dis-
). The Jessie Mines Co. claimed to have 150,000 tons of ore
for mining, worth, at a conservative estimate, $2,000,000, which,
as untrue, and paid quarterly dividends of 3% while peddling
vas a mere bit of stock-jobbery, although its promoters managed to
Main shaft is 667' deep, and mine is claimed to have produced
$750,000 in gold under ownership previous to that of the Jessie

COPPER CO. **MEXICO.**
hicago, Ills. Mine office: Autlán, Jalisco, Mex. Thos. Kelly, presi-
laus F. Ossolinski, manager. Lands include El Refugio mine, show-
op for nearly a mile. Property is said to have an extensive ore
ng mainly copper values. Management plans building a wagon
nela, on the Pacific, and erecting a mill.

MINING CO. **NEVADA.**
ice: Yerington, Lyon Co., Nev. Lands, near Wheeler Pass, include
Beaman properties, taken over February, 1909. Development is by
, said to show a 12' vein carrying 5 stringers of high grade ore,
s of ore on the dump giving assays of $50 per ton.

NION COPPER MINING CO. **ARIZONA.**
Was succeeded, circa 1895, by Old Dominion Copper Mining &
Formerly at Globe, Gila Co., Ariz.

Y MINING CO. **WASHINGTON.**
olumbus, Ohio. Mine office: Chesaw, Okanogan Co., Wash. John
resident. Mine has shipped ore giving smelter returns of $47.50
pper, gold, silver and lead, in order named. In April, 1909, man-
nned erecting a new process copper smelter, of 100 tons daily
an estimated cost of $20,000.

NING CO. **COLORADO.**
Was merged, 1903, in San Juan Smelting & Refining Co. Formerly
San Juan Co., Colo.

ER MINING CO. **CALIFORNIA.**
d mine: Coram, Shasta Co., Cal. Alfred Onn, president; W. C. Onn,
l treasurer; preceding officers, Arthur E. Onn, Frederick S. Lanyon
iacs, directors. Organized under laws of Arizona, with capitaliza-
00, shares $2 par. Lands, 22 claims, area 440 acres, known as the
e group, showing a gossan giving assays of $3 to $8 per ton in gold,
lver and copper. Mine is claimed to have 4,000' of workings, show-
ying 8 to 10% copper and $5 to $6 gold per ton, with some silver,
s are considered above the actual average of ore values. Company
on to use the Balaklala wagon road, and prospectus announces that

the corporation will be conducted on strictly
pectus also claims that the Mammoth mine, in th
worth of ore in sight, which, of course, is untrue.

ONO MINING CO.

Mine office: Funatsu, Yoshiki-gori, Hida, J
mine, having an 86-h. p. installation, and employ
year production was 77,879 lbs. fine copper and 2

OPHIR GOLD & COPPER MINING CO.

Mine office: Lewis Ponds, Bathurst Co., N
southeast of Lewis Ponds, opened 1852, was re
pany, which cleaned out an old 600′ tunnel, ret
sunk a new 85′ shaft. Property is said to show
tunnel, with large bodies of low grade ore in th
duced considerable ore, in early days, from th
auriferous copper ore with quartz gangue, 200 to
but the sulphide ores give assays of 1% or und
ently are unworkable.

OPHIR MINING CO.

Office: 341 Carondelet St., New Orleans, La.
Co., Ariz. John Nelson, president and treasurer;
general manager; D. J. Holt, secretary. Organiz
capitalization $500,000, shares $1 par. Lands, 8
ing the Black Mountain Mining & Milling Co.,
from Jerome Junction, from which ore has been
copper, with some gold and silver. The comp
crudities and glittering generalities, and states
you are looking for a safety deposit vault of s
good copper mine. The Ophir Mining Co. is one
favorably.

ORANGE BLOSSOM EXTENSION MINING &

Office: San Diego, Cal. Mine office: Bagdad,
Hodgman, president; J. M. Dodge, vice presid
tary; R. B. Dodge, treasurer; preceding officer
Lands, 20 claims, having a 125′ tunnel and a 715′
claim, with about 3,000′ of workings. Improve
buildings and an 8-stamp mill with Nissen he
cannot be treated profitably with present limited

OREGON & BRITISH COLUMBIA MINING & DEVELOPING CO.

Office: 218 Board of Trade, Portland, Ore.
dary district, B. C. Lands, for which application
filed, have several shallow shafts and short tunne

OREGON-COLORADO MINING, MILLING & D

Mine office: Bohemia, Lane Co., Ore. F. J.
copper prospect, under development with a smal

ORION ORO DEVELOPMENT CO.

Office: Rock Island, Ills. Mine office: Vick
Satterdahl, manager. Lands, about 2 miles west
slope of the Granite Wash Mountains, have seve
shaft cutting several veins, and, at last accounts
a vertical shaft.

OROGRANDE SMELTING CO.

Mine and works office: Orogrande, Otero Co
struction of the South West Smelting & Refini
claims, area 720 acres, an 80-acre smelter and

g total holdings of 1,440 acres, in the Silver Hill district of Otero
n the Organ district of Donna Ana County. Principal holdings are
Hill district, in the Jarilla Mountains, circa 60 miles north of El
addition to copper lands, the company holds sundry placer gold
mine of auriferous iron ore, highly suitable for fluxing. The com-
ns a limestone quarry for flux, which has been claimed in the press
ents to $6 gold per ton, which seems to have been too good to be

mining properties are the Lucky, Nanny Baird, Iron Mask and
. The three properties first named show limestone and porphyry,
ontact deposits, of which 7, more or less developed, range from 3'
lth, with known lengths of 100' to 700', carrying native copper.
nalachite, said to give average assays of 7% copper, 2 oz. silver
er ton, which figures are too high, all ores being slightly argentif-
ongly auriferous.
y mine, developed by a 300' shaft, and by tunnels of 250' and 625',
ow a large amount of auriferous copper ore averaging circa 7%
6 gold per ton, also considered too high, and the mine has proven
500' tramway from the mine leads to the railway track.
ny Baird mine has a vein of circa 25' average width, carrying
and silver values, with good gold values, and to the south is a
ract, of some promise. Development in the Nannie Baird is by
al shaft and an 800' incline shaft. The Lucky and Nanny Baird
have about one mile of workings, estimated by former owners to
tons of ore of good average grade blocked out for stoping, which
oo high.
Mask mine, on Iron Mountain, has auriferous iron ore, assaying
0% iron and $2 to $8 gold per ton, with an estimated average gold
to $4, also considered too high. It is planned to reach the Iron
ilroad spur.
net mine has a 480' shaft, equipment including a 20-h. p. gasoline
n air-compressor.
ing plant includes three 85-h. p. boilers, two 8x10" hoists, good for
d 2 Sullivan air-compressors, of 28 drills aggregate capacity, with
lls.
s, 22 in number, include 4 smithies, a 20x40' machine-shop, general
ssay office and laboratory. The townsite of Orogrande has electric
telephone exchange, maintained by the company.

brought, 21 miles, from a dam across the Sacramento River, in the
Mountains, by a 6" pipe-line, leading to a 25,000,000-gallon reser-
side of Baird Hill, just above the townsite. The daily flow of the
to be 10,000,000 gallons, and the capacity of the pipe-line is said
00,000 gallons daily, delivering water at about 800 lbs. pressure per
under a static head of 1,500'. If these figures are correct there is
parent for the use of steam power.

ltersite, less than a mile from Jarilla Junction, is about 1½ miles
ie, and the plant includes ore-bins, a sampling mill, furnace build-
er-house. The furnace building, of steel, is designed for two 250-
, with equipment in place for both, but only one furnace is
s having been blown in early November, 1907. The furnace build-
5' steel smokestack, of 14' diameter at the base and 9' at the top.
s reached by a private spur track from the El Paso & Northeastern
is connected by a branch line with the mines.

lter power plant has three 150-h. p. Heine boilers, two 120-h. p.

ain tunnel, with about one-half mile of workings. Mine has rail con- and a 200-h. p. electric plant.

MINING CO. **NEW MEXICO.**

e office: Lordsburg, Grant Co., N. M. Lands, 52 claims, area 1,145 the Virginia district, formerly held by Aberdeen Copper Co., which ery badly managed concern, paying a dividend of $32,175 which came e of treasury stock, and not from earnings.

perty is said to show 10 fissure veins, of which 7, of about 5′ average re more or less developed, having 8 shallow shafts, deepest 400′, which nned to sink to 600′ and possibly 1,000′, mine having about 3,000′ of s. Equipment includes steam power, air-compressor and a 50-ton con- r.

VASH CONSOLIDATED MINES CO. **WASHINGTON.**

e office: Conconully, Okanogan Co., Wash. Wm. Baines, president; H. ell, vice-president; F. J. May, secretary and treasurer; David Gubser, manager; Dr. Jacob May, fiscal agent. Organized as successor of Wash- Consolidated Copper Co., and has absorbed several minor companies, irca 50 claims, in the Mineral Hill district, including the Mineral Hill 20 claims, originally held by Mineral Hill Mining Co, and later by ton Tunnel & Copper Co. The Mineral Hill group has an 1,800′ tunnel, ut 3 veins carrying auriferous and argentiferous copper ores, mainly rous tetrahedrite. The 400′ main tunnel is planned to be continued to o cut 8 known ledges. Mine also has several shallow shafts. Property vailable water power, rated as capable of developing circa 4,000 h. p., a steam plant, crusher, ore-bunkers and sawmill.

IC CONSOLIDATED GOLD MINES CO. **COLORADO.**

e office: Central City, Gilpin Co., Colo. John C. Planchuelz, superin- Mine carries auriferous and argentiferous copper ore, with values n the precious metals. Equipment includes a steam plant, air-com- 70-stamp mill and 150-ton concentrator.

, DODGE & CO., INC. **ARIZONA & MEXICO.**

e: 99 John St., New York, N. Y. Prest., Jas. Douglas, president; Geo secretary; preceding officers, Cleveland H. Dodge, Arthur C. Agnew, ean, Geo. B. Agnew, E. H. Perry, Francis L. Hine, V. Hayward and Osburn, directors. Organized Dec. 14, 1908, under laws of New York, talization $50,000,000, shares $100 par. Shares are listed on the New ork Exchange. Company was organized as successor by the firm of Dodge & Co., composed of Cleveland H. Dodge, Arthur Curtis, R. C. nd Jas. McLean. The firm of Phelps, Dodge & Co. has a history of century, its founder, Wm. Earle Dodge, having been one of the great merchants of America, and a noted philanthropist. The company pays quarterly dividends at $2.50 per share, and earned, 1909, a safe margin e dividends, with copper selling on an average at 13 cents per lb.

any controls, through ownership of more than 90% of the various ons, the Copper Queen Consolidated Mining Co., Montezuma Copper mit Copper Mining Co. at Morenci, and Ray Central Ray Co., Ariz- ed at $6,000,000. Company apparently owns or controls in the Old s or Indiana & Sonora, which are controlled by the members of the Company does not own the El Paso & Southwestern Railway system, controlled by the Phelps Dodge interests, owners of a very good majority of ed Phelps Dodge & Co., Inc. The company is reported to have taken k in the various subsidiary companies on the basis of $75 for each e of the Copper Queen, $50 for each $100 share of the Montezuma, each $100 share of the Detroit Copper Co., and $100 for each $100 Ray Central Ray Co., this arrangement calling for nearly $17,000,000

l absorbed the Tetro company, circa March, 1909. Shares are listed on Lake stock exchange.

ds, 14 patented claims, including the Tetro group, carrying auriferous entiferous lead and copper ores. Company began operations Feb. 1, roperty has a 500′ shaft and circa 3,500′ of tunnels. In 1909 new work ed a 3′ vein of carbonate ore, averaging about 45% lead and 30 oz. sil- ton. Equipment includes a 75-h. p. electric motor, hoist and air-com- and improvements include an office, shops and necessary mine build- Production, 1903-1904, under former ownership, was 1,250 tons of ore, have netted $70,000. Management is good and property considered e.

OSA MINING CO., LTD. **CHILE.**

ce: Dashwood House, New Broad St., London, E. C., Eng. Operating Antofagasta, Chile. Mine office: Collahuasi, Tarapacá, Chile. Em- rca 500 men. A. Bertrand, D. Burns, C. Furn, F. W. Hayne and J. R. irectors; F. W. Bishop, secretary. There also is a Chilean board, with as follows: Juan G. Searle, president; Carlos A. L. Dick, secretary; outh American Bank, treasurer, preceding officers, Carlos Gregorio Gustavo Jullian, Thompson Matthews and Carlos A. Gibbes, directors; Hawxhurst, Jr., general manager; M. A. Wolff, superintendent; August mine superintendent; A. Y. Hardy, engineer.

anized Nov. 27, 1908, under laws of Great Britain, with capitalization), shares £5 par, fully issued and fully paid. Corporation is merely a uction of Compañía Minera Poderosa de Collahuasi, organized to bring perty under the laws of Great Britain, in order to make an English for the shares. The new corporation paid the old company £480,000 in ull paid shares for its property. The old company showed a profit of for 6 months ending June 30, 1908, and paid dividends of £60,000.

ds, 37 contiguous claims, area 185 hectares, equal to 457 acres, carrying e of the ore formation for 4,500′. Lands inclue the Poderosa mine, which rincipal property, and the San Carlos, Rosario and Condor mines. Lands, at an extreme elevation of 15,400′, on the Bolivian plateau, lie above ber-line, and are barren of vegetation, with the exception of a fungus the botanical name of fungi cordillerensi, which forms the local fuel of rict. There are no high hills in the vicinity, lands being on the top levated plateau, surrounded, at a considerable distance, by high peaks ndes. There are no running streams, and potable water is scarce. The is extremely bleak, winter prevailing 12 months yearly, with snow or ling nearly every day in the year. Copper mines in the district were in the era of Spanish domination, and previously by the Indians, as y the ancient remains of furnaces, fragments of matte, scoria, and tools old workings.

country-rock is feldspar-porphyry, stratified and fissile, there being a tratification, with dip of about 70 degrees to the westward, with an loidal diabase running northwest and southeast, dipping with the coun- to the westward, ore bodies occurring in contact with and in the im- vicinity of the intrusive dykes. There has been considerable disinte- and overburden covers the rock formation so that few outcrops are hese usually carrying low grade malachite and chrysocolla, or brochant- gangue being mainly felsitic rock, much decomposed. The Poderosa sists of several parallel bodies of partly or wholly decomposed country ith considerable faulting, having a general strike of N. 40 W., crossed, ically right angles, by a secondary set of leaner veins, the master veins ssures in a shear-zone. Characteristic ores of the Poderosa system are melaconite, malachite, chalcocite, covellite, bornite, chalcopyrite,

chrysocolla, brochantite, atacamite and tetrahedrite, the latter deci
gentiferous, the ores, as a whole, averaging about 8 to 12 oz. silver p
ton.

The Poderosa mine, which is the principal property, has a 433' m
with about 7,000' of workings, carrying oxidized ores on the 400' le
mine has 2 veins, known as the Poderosa and Portillo, of 3' to 30' w
rying paystreaks of high grade ore 1' to 20' wide, with average width
4', the gangue being decomposed quartzose felsite, very soft, requir
timbering, while, unfortunately, the old timbering remaining in pl
tremely poor. The hanging-wall is well defined, but the ore shades
into the altered country-rock of the footwall, there being a fluccan,
3" to 12", and even up to 4' width, on the hanging, with an occasi
on the footwall. The main shaft is only 6x8' inside of timbers, and
cut down to larger size, and the shaft is in the hanging-wall, west o
crossing the vein about the fourth level, with five levels opened, s
meter intervals, the shaft cutting another vein about midway betwee
and sixth levels, this vein, averaging circa 30" width and dipping t
main vein, carrying exceedingly high grade ore. The various level
nected by winzes. There are indications that the ore will grow r
the base zone is reached. The mine is quite wet, making about 90,
of water per day, in the wet season. Estimated ore reserves of th
mine alone, March, 1907, were 101,600 long tons, with an averag
23.66% copper, and circa 10 oz. silver per long ton. These figures, wh
ing very high, seem warranted. Equipment of the Poderosa mine is
consisting only of a wooden head-frame, with a 10x15" single Ta
raising half-ton buckets.

The Rosario mine, northwest of the Poderosa, has a 166' inclin
a 30" vein dipping at about 80°, ore assaying about 15% copper, s
bottomed in the top of the base zone, which shows chalcopyrite, a
and pyrite. The San Carlos mine, practically an extension of the Po
to be connected therewith, has a 146' shaft, showing a 3' vein carr
about 19% average copper tenor. The Condor mine has a 147' sha
a 2' vein carrying ore giving average assays of about 18% copper.
panil mine, a new property, is being opened by shaft. Mine timbe
fir and pine, costing, at Antofagasta, £9 per thousand feet, with 4d.
foot transportation charges thence to the mine. During the period
ment, supplies and ore were hauled 65 miles, over an extremely rou
tween Estación Carcote and the mine, one week being required fo
trip, but a branch of the Antofagasta & Bolivian railway has been
Ollagüe to the mine.

Labor is supplied mainly by Bolivian Indians, from the neig
public, who work intermittently, putting in about half time, an
drunken and lazy, but, bad as it is, the labor supply is short, thou
pletion of the railway should give improvement. The manager de
port Chinese, which would seem a sensible plan.

The mine has 9x18" and 6x20" crushers, reducing ore to 2" to
fore shipment. Ore formerly was hand-picked to an average ten
45% copper, for shipment, and ore shipped, to end of 1906, was 7
grams, giving average returns of nearly 40% copper and 17.5 oz. sil
ton. Production, 1908, is estimated at 8,000,000 lbs. fine copper.

This is a property of exceptional promise, and has been well
Mr. Hawxhurst, under exceedingly trying circumstances.

POINT LEWIS REDUCTION WORKS. CA

Owned by Mountain Copper Co., Ltd., at Martinez, Contra Co

F-SYSSTERSKI WORKS. **RUSSIA.**
e and works office: Nijni-Tagilsk, Perm, Russia. Property is a smelter. on, first 9 months of 1908, was 10,462 poods, equal to 377,804 lbs. fine nd production, 1908, is estimated at 500,000 lbs. fine copper.

GHORN MINING CO. **CALIFORNIA.**
e office: Ingot, Shasta Co., Cal. R. Polkinghorn, superintendent. Lands, in process of patenting, developed by shaft. Presumably idle.

KOBBERGRUBER. **NORWAY.**
e office: Porsa, Altenfjord, Finmarken, Tromsö, Norway. Ingolf d, manager. Mine was under development with a small force at last

SE COPPER SYNDICATE. **TRANSVAAL.**
e office: Pietersburg, Zoutpansberg, Transvaal. Property is mineral the farm Wagendrift, on the Buffels road, about 50 miles from Pieters- small shipment of ore, for test purposes, was made November, 1908.

MINES DEVELOPMENT CO. **COLORADO.**
e office: Copperfield, Frémont Co., Colo. E. S. Halter, superintendent. carries copper ore, and is developing with steam power and a small

RO A. PROAÑO. **PERÚ.**
ks office: Pacococha, Junín, Perú. Property includes La Victoria ar Backus & Johnston, at Morococha, the Chapichaca mine, and various the Tamboraque district. Principal property is the Germania y Perú the Pacococha district, having a 3′ to 6′ vein, producing ore assaying copper, and 10 to 20 oz. silver per short ton.
smelter, known as La Fundición Tamboraque, 120 kilometer from t an elevation of 9,820′ above sea level, built 1906, has a 40-ton water- last-furnace. Production, 1907, was 1,055 metric tons of ore averaging er and 1,140 grams silver per metric ton, yielding 139,551 lbs. fine cop- 1,202 kgs. silver.

NTORY MINING CO. **UTAH.**
e office: Promontory, Box Elder Co., Utah. Property, near Promontory as an 88′ incline shaft showing an 8′ vein, with a 14″ paystreak carry- ssaying 5 to 18% copper, 1 to 40 oz. silver and $9 gold per ton.

NTORY SIGNAL MINING CO. **UTAH.**
e: Salt Lake City, Utah. Mine office: Promontory, Box Elder Co., . F. Lehn, president and treasurer; W. E. Buys, vice-president; Ed. A. secretary; H. E. Buys, manager; preceding officers, G. L. Asher, H. C. and L. J. Risco, directors. Organized circa July, 1908, under laws of th capitalization $60,000, shares 10 cents par.

ÑÍA MINERA LA PROTECTORA y ANEXAS. **MEXICO.**
e: Gante 12, Mexico, D. F. Mine office: San Salvador, Mazapil, s, Mex. Percy A. Babb, president and general manager; J. L. Miranda, ; D. B. Andrews, superintendent. Organized 1907, under laws of Mex- capitalization 100,000 pesos, fully paid in. Lands, 68 hectares, includ- Protectora y Anexas and San Francisco mines, carrying argentiferous nd carbonates of copper, lead and zinc, occurring as replacements in e. Low grade ores average 2.5 to 5% copper, and high grade ores 12 copper. Mine has a depth of 100 meters, with about 1,500 meters of . Equipment includes a 15-h. p. hoist. Employed about 50 men at unts.

ENCE COPPER CO. **ARIZONA.**
e: 18 Tremont St., Boston, Mass. Mine office: Paradise, Cochise Co., A. Lewandowski, general manager; Samuel S. Supplee, superintendent. d 1908, under laws of Arizona, with capitalization $1,250,000. Lands,

ruction of the Okanogan County electric railway from Nighthawk to ster, Washington, crossing the Q. S. property, and it is hoped this line will mpleted in 1910.

Notwithstanding the claims of the company as to tonnage and ore values, are greater than are warranted by present developments, the property is f much promise, and the management, despite its financial troubles in the is to be commended for its persistence, while the work done seems well ed and executed.

IBY MINING CO. **CALIFORNIA.**

line office: Quinby, Trinity Co., Cal. Lands, 6 claims, on Quinby Creek, ing a vein of 4′ to 6′ width, opened by tunnels of 100′ and 120′, with 1,000′ of workings, showing chalcopyrite, associated with pyrite in quartz ie. Copper in the upper portion of the vein is oxidized, leached and rede- d as chalcanthite. Property has a small mill, treating ore for gold values.

CY-THOMPSON CONSOLIDATED MINING CO. **UTAH.**

line office: Park City, Summit Co., Utah. Organized circa July, 1909, apitalization $1,250,000, shares $1 par, as a merger of West Quincy Min- g. and Thompson Mining Co., and, of the capitalization, 400,000 shares given the West Quincy, 330,000 shares were given the Thompson Mining nd 200,000 shares were given the Daly West, and Ontario companies for ge and operation easements, leaving 370,000 shares in the treasury.

roperty of the West Quincy Mining Co. was a ⅝ interest, with an option remaining interest, in the mine of the J. I. C. Mining Co. Lands of the . are 5 claims, supposed to carry the extension of the Quincy ore body of aly West mine. Development is by a 625′ two-compartment vertical and a crosscut tunnel through the Little Bell mine, cutting a contact t carrying ore assaying up to 20% lead, 160 oz. silver and $2 gold per ton. expected that the main ore body will be cut at depth giving a back of nd that the Daly West contact ore body should be cut at depth giving a of 900′. Considerable trouble has been had from shifting ground and a inflow of water. Property was probed, 1907, to depth of 1,300′, by nd drills.

TAN REFINING WORKS. **NEW JERSEY.**

wned by International Smelting & Refining Co., at Perth Amboy, Middle- ., N. J.

CENTRAL COPPER MINING CO. **ARIZONA.**

ffice: 42 Broadway, New York, N. Y. Mine office: Ray, Pinal Co., Ariz. ys 138 men. Julius A. Lewisohn, president; Oscar A. Turner, first vice- ent; Benj. A. Hazell, second vice-president; Julius H. Susmann, secre- nd treasurer; preceding officers, Thos. P. Dyer, Meyer Schamberg, Wm. rpe, N. Bruce McKelvie and Alvin Untermeyer, directors; Ralph B. Will- superintendent; J. Parke Channing, consulting engineer.

rganized Jan. 28, 1909, under laws of Delaware, with capitalization ,000, shares $5 par; issued $4,000,000. Bonds, $2,000,00 authorized, at old, convertible at par into shares at any time between March 1, 1911, larch 1, 1916. Company holds 200,000 shares unissued, in the treasury, t the convertible bonds authorized but unissued. Bankers Trust Co., New registrar. Shares are listed on the New York curb. Annual meeting, Wednesday in January.

ompany is controlled by the Lewisohn interests, through the General pment Co. Property was bought of the Kelvin-Calumet Copper Mining share of Ray Central being given for 5 shares of Kelvin-Calumet, and, ing to the contract of sale with the Kelvin-Calumet, the Ray Central has end not less than $310,000 on development work during 1909, and ,000 subsequently. Company was said, April, 1909, to have expended, in

cash and shares, $3,714,000 for lands and option to have $246,000 cash in its treasury.

Lands, circa 380 acres, including the Big L Kelvin-Calumet in March, 1909, and 3 claim bought circa July, 1909, and the Carrie Natio group bought August, 1909. Property as a wh 15, 1909.

The Globe-Isabella group of 30 acres is ent of the Ray Consolidated, and the company ho to 12,000,000 tons of low grade disseminated average grade as the Ray Consolidated, of whi The Globe-Isabella tract, developed by the 300 surface, and at depth carries chalcocite dissem in sight June, 1909, on the Globe-Isabella tra 3% average copper tenor. Developments on two shafts, about 400′ apart, of which one, of laine, shipped, under former ownership, some h with oxidized ores claimed to average circa 3 and silver values.

The Calumet group, area circa 100 acres, h grade carbonate ores. Geological conditions similar to those at the Globe-Isabella, though n as yet in the schist, considerable work having between schist and greenstone, from which sl smelting ore have been made in the past.

The Copper Contact group, area about 40

The power plant at the Madelaine shaft steam hoist and a 12-drill air-compressor.

The Big Lead property has an old 4-stamp centrator, including a 35-ton McIntosh leachin a secret process to secure instantaneous resu forthcoming. Mill is terraced, all material bei doubtful whether operations will be carried on management, which is not given to secret proce per at a profit by the ordinary means of mining

Production, 1907, of the Big Lead mine, w agement is good and property considered decid

RAYMOND-ILLINOIS MINING CO.

Mine office: Eureka, Juab Co., Utah. J preceding officer, Hon. Thomas Kearns, John Ly Wheeler, directors. Mine has a 1,500′ vertic workings, which, as yet, have shown but littl ment planned diamond drilling to test the gro ent workings.

RAY NORTHERN COPPER CO.

Office: Phoenix, Ariz. Mine office: Ray, president; Dr. Walter Harvey Weed, consulting 1909, with capitalization $1,000,000. Lands, 14 group, 2 miles north of Ray, said to have ab some ore of fair grade. Sinking of a new mai tember, 1909.

RED MOUNTAIN COPPER-GOLD MINING

Office and mine: Cisco, Nevada Co., Cal. 640 acres, unpatented, 3½ miles from Cisco, sh ous copper ore between schist and slate walls,

.5% copper, 1 oz. silver and $15.50 gold per ton. Mine has but slight ipment, and presumably is idle.

RAVEN MINING CO. **B. C.**

Mine office: Jedway, Queen Charlotte Island, B. C. Property, on Moresby l of the Queen Charlotte group, is in the vicinity of Awaya, Ikeda & Co. ıably idle.

ROVER COPPER MINING CO. **ARIZONA.**

ffice and mine: Phoenix, Maricopa Co., Ariz. Organized circa July, 1909, laws of Arizona, with capitalization $1,000,000, shares $1 par. Lands, aims, known as the Red Rover group, 15 miles north of Camp Creek and les north of Phoenix, the nearest railroad point. Mine has a 200′ tunnel 200′ incline shaft, with about one-half mile of workings, showing a 10′ ody between limestone and porphyry, carrying a 3′ paystreak estimated erage 10% copper, 6 to 60 oz. silver and $20 gold per ton. The Red Rover discovered 1882, has shipped, from shallow workings, about $200,000 of high grade ore, running about 15 to 25% copper, with values mainly ver chlorides, one carload of 20 tons netting $41,000, with no allowance for copper contents.

AURADORA MINING & MILLING CO. **MEXICO.**

line office: Huautla, Juárez, Morelos, Mex. Chas. L. North, general man- Mine carries auriferous and argentiferous copper and lead ores. Equip- includes a steam plant and 20-ton mill.

DAD MINERA LA RICA MINA (BAJO RIO TINTO). **SPAIN.**

ffice: 7 Calle Churruca, San Sebastian, Spain. Mine office: Berrocal, a, Spain. Prince J. Piguatelli de Aragon, P. Duthie de la Tuque, A. Bar- . Fernandez and E. Wisse, directors. Organized Jan. 1, 1907, under laws in, with capitalization 1,250,000 pesetas, 5 pesetas par. Lands include a mine.

ARDS-CLIFTON MINING CO. **UTAH.**

ffice: Salt Lake City, Utah. Mine office: Ibapah, Tooele Co., Utah. P. Richards, president; Richard W. Young, vice-president; Harold E. , secretary and treasurer. Organized September, 1909, under laws of with capitalization $50,000, shares $1 par. Property is in the Clifton t.

FIELD CONSOLIDATED MINING CO. **UTAH.**

ffice and mine: Bingham Canyon, Salt Lake Co., Utah. Organized circa t, 1907, under laws of Utah, with capitalization $100,000 shares, 10 cents Thos. H. Quillen, president; Francis W. Quinn, secretary and treasurer; ling officers, E. C. Ashton and Ray Van Cott, directors. Lands, 4 claims, West Mountain district.

INTO TREADWELL MINING CO. **WASHINGTON.**

line office: Curlew, Ferry Co., Wash. G. B. Dennis, president; J. L. Mar- anager. Lands, 7 claims, 24 miles from Phoenix, B. C., showing 4 parallel with north and south strike, claimed to range 50′ to 100′ in width. Ore lcopyrite, associated with galena, both argentiferous and auriferous, giv- says up to $18.50 per ton, in combined values of copper, lead, silver and Mine has several shallow shafts and an 85′ tunnel, latter planned to be to 400′.

AQUI CO. **MEXICO.**

ffice: Bisbee, Ariz. Mine office: San Antonio de la Huerta, Ures, , Mex. Fritz L. Harrington, president; Geo. Buxton, vice-president; A. eler, secretary; Jos. E. Morrison, treasurer. Organized circa 1909. Lands, acres, adjacent to San Antonio Copper Co., including the San Antonio do group, showing some traces of antigua workings.

showing mainly sulphides, with some copper oxides, associated with lead, and antimony, all slightly auriferous.

ESELSKABET SAINT KNUT'S GRUBER. **NORWAY.**

Mine office: Lille-Elvedalen, Trondhjem, Norway. A. M. Baastad, agent. ized under laws of Norway, with capitalization 100,000 kroner. At last its was doing exploratory work for copper, with a small force.

T MARY MINING CO. **UTAH.**

Office: Palladio Bldg., Duluth, Minn. Mine office: Milford, Beaver Co., Patrick Ryan, president and treasurer; L. B. Bohn, vice-president; P. D. ing, secretary; preceding officers, Jas. Barrett and Isidore Lessing, direc- W. J. Merritt, superintendent. Lands, 3 claims, 2 patented, area 30 acres, e eastern flank of Picacho Mountain, 4 miles from Milford, in the Star ct. Mine has an 85′ two-compartment shaft and a 375′ tunnel. A carload ment of ore gave smelter returns of 17.07% copper, 2.5% zinc, 10.5 oz. r and $2.20 gold per ton. Equipment includes a 36-h. p. gasoline hoist.

NEOT MINING SYNDICATE, LTD. **ENGLAND.**

Office: 6 Queen Street Place, London, E. C., Eng. Mine office: Liskeard, wall, Eng. W. F. Garland, secretary; John Taylor & Sons, managers. nized July 4, 1907, under laws of Great Britain, with capitalization £5,000, es £1 par; issued, £4,907, of which 1,000 shares are fully paid and 3,907 are paid in. Property is an option over copper and tin mining rights, in the sh of St. Neot, near Liskeard, consideration for which was £1,000 in full shares.

ERINO SALAZAR. **MEXICO.**

Mine office: Matehuala, Catorce, San Luis Potosí, Mex. Lands, 9 groups, 60 hectares, including La Valenciana mine at Hacienda de Vánegas, near ehuala, developed to depth of about 60 meters, carrying argentiferous cop- carbonates, from which a small production has been secured. Also owns Independencia mine, near Concepción del Oro, Zacatecas, Mexico, area 38 ares.

TDALEN OG STREMEN'S GRUBERSELSKAB. **NORWAY.**

Office: Gransvits, Norway. Mine office: Kaafjord, Tromsö, Norway. perty is sundry copper claims, under development at last accounts, in 1907.

TILLO MINING & MILLING CO. **MEXICO.**

Mine office: El Salado, Catorce, San Luis Potosí, Mex. Merle M. Stewart, ral manager. Property is El Saltillito mine, carrying auriferous and ar- iferous copper ores, with values mainly in the precious metals. Equipment des steam and electric plants and a 3-stamp mill. Employs circa 100 men.

UDA COPPER MINING CO. **SOUTH CAROLINA.**

Office: Lynchburg, Va. Mine office: Donalds, Abbeville Co., S. C. Frank arman, president; J. P. Smith, vice-president; John F. McGee, secretary, surer and general manager; preceding officers, P. K. McCully, Sr., J. M. Mc- ell, Thos. Atten and G. W. Ould, directors. Organized under laws of South lina, with capitalization $50,000. Lands, about a mile from Donalds, were ected, to some extent, by individuals, before organization of present com- Development is by temporary shafts, showing sulphide copper ore carry- small quantities of gold. It is claimed that the average of 10 assays was copper, which seems doubtful, unless samples were selected with great Company plans shipping ore to Ducktown, Tennessee, and building a er later.

AÑÍA MINERA SAN BERNABE y ANEXAS. **MÉXICO.**

Office and mine: Zacatecas, Zacatecas, Mex. C. A. Bentley, manager. s, 25 hectares, including La Confianza, El Faro and La Fama mines, west e Malanoche mine. Lands include the oldest mine in Zacatecas, discov- circa A. D. 1546, which was a considerable producer of silver in olden

days. Property formerly was under option to an English company, but option was dropped after unwatering the old shaft. Ore is highly argentiferous copper, associated with some lead, values being mainly in silver. Was shipping, April, 1909, some copper and lead ore.

MINA SAN BRUNO. SPAIN

Mine office: Paimogo, Huelva, Spain. Lands adjoin the Sociedad Anonima Minas Peñuelas Paimogo. Mine, supposedly bottomed, is not a producer, but ore outcrops apparently might be followed. Idle.

SAN CARLOS MINING CO. MEXICO

Office: 42 Broadway, New York, N. Y. Mine office: Ures, Sonora, Mex. Jos. H. Everett, president; F. Willard Carlisle, secretary and treasurer, Geo. D. Stonestreet, engineer. Capitalization $500,000, shares $1 par. Company planned, August, 1909, to reorganize under proposed title of Sonora United Mines. Lands, 169 acres, including various groups. San Carlos No. 1, area 9 acres, and San Carlos No. 2, adjoining, area 50 acres, are 9 miles south of Matape and 45 miles northeast of the terminal of the Torres y Prieta railroad, connecting with the Southern Pacific. The San Carlos group shows good outcrops, and has several veins carrying rich ore. La Paloma group, area 25 acres, 8 miles from Matape, has a 50′ shaft, showing ore assaying 13% copper. A 15-ton mill was installed, April, 1908, on San Carlos No. 1.

SAN JUAN MINES CO. MEXICO

Office: 317 Equitable Bldg., Denver, Colo. Mine office: San Javier, Hermosillo, Sonora, Mex. J. F. Williams, superintendent. Ores carry gold, silver and copper values. Was developing with a small force at last accounts.

COMPAÑÍA MINERA DE SAN LUIS POTOSÍ. MEXICO

Mine office: Mapimí, Durango, Mex. Property is the Siderita y Anexas mines, carrying copper ore. Was a small producer at last accounts.

SAN LUIS POTOSÍ SMELTER. MEXICO

Owned by Compañía Metalurgica Mexicana, at San Luis Potosí, S. L. P., Mex.

SAN MARCOS MINING CO. MEXICO

Office: Calle Espiritu Santo 5, Mexico, D. F. Mine office: Etzatlán, Ahualulco, Jalisco, Mex. F. W. Green, president; T. J. Pomeroy, secretary and treasurer; Riley R. Morrison, general manager; E. B. Elliott, superintendent. Lands, 100 acres, on Tepehuaje Mountain, in vicinity of Etzatlán, showing veins carrying copper, which have been slightly developed.

SAN MARINO MINING & MILLING CO. WASHINGTON

Mine office: Nespelem, Okanogan Co., Wash. Capitalization $50,000. Lands, 4 claims, area 64 acres, in process of patenting. Property shows a north and south vein and 3 cross veins. Development is by a 180′ tunnel, with lead of 150′, intersecting a 12′ vein carrying mainly gold and silver values; by an opencut 25′ deep showing ore assaying well in gold and silver, and by shafts of 28′ and 40′, latter showing ore assaying 2 to 3% copper and $2.60 per ton in combined gold and silver values.

SAN MARTÍN MINING CO. MEXICO

Office: : Paseo Bolivar 407, Chihuahua, Chih., Mex. Mine office: Urraldi, Rayón, Chihuahua, Mex. John J. Clague and John J. Waterson, managers. Lands, 68 hectares, having 4 shafts and a 1,600′ tunnel, developing ore carrying copper, lead, zinc, silver and gold. Equipment includes a 50-h. p. Pelton wheel and a concentrator with two 4′ Bryan mills, 2 Bartlett tables and 3 Wilfley tables. There also is a small smelter with 25-ton reverberatory furnace. Employed about 50 men at last accounts.

SAN ROBERTO MINING CO. MEXICO

Office and mine: Zacatecas, Zacatecas, Mex. C. A. Bentley, general man-

Property, slightly developed, shows auriferous and argentiferous copper lead ores, and small smelter shipments have been made.

SALVADOR MINING CO. **MEXICO.**

Mine office: Terrazas, Iturbide, Chihuahua, Mex. Alberto Terrazas, presi- Felix MacDonald, general manager. Property is San Salvador mine, ed by 2 shafts, showing lead and copper ores. Has a gasoline hoist.

TIMOTEO MINING & SMELTING CO. **MEXICO.**

Mine office: Uruáchic, Rayón, Chihuahua, Mex. T. A. Ripperdan, super- dent. Mine carries auriferous and slightly argentiferous copper ore, said verage about 50 pesos per ton in gross values. A smelter, built 1909, has -ton reverberatory matting furnace.

TA ANA MINING CO. **MÉXICO.**

Office: Paseo Bolivar 284, Chihuahua, Mex. Mine office: Jiménez, Chi- ua, Mex. Alberto Goldschmidt, president and general manager. Property, ilometers from Jiménez, has a 150′ shaft developing auriferous copper ore. umably idle.

IPAÑÍA MINERA SANTA ELENA DEL COBRE y ANEXAS, S. A. **MEXICO.**

Mine office: Sultepec, Mexico, Mex. Organized Aug. 24, 1907, under laws lexico, with capitalization 66,000 pesos. Property includes La Santa Elena, rotectorio, La Salvadora and La Esmeralda mines.

TA FÉ CONSOLIDATED MINING CO. **MEXICO.**

Office: Bisbee, Ariz. Mine office: La Cananea, Arizpe, Sonora, Mex. Tehaney, president; B. A. Packard, vice-president; C. I. McReynolds, sec- y; R. L. O'Neil, treasurer; preceding officers and C. W. McHenry, directors. nized April, 1909, under laws of Arizona, with capitalization $500,000, es $2.50 par. Lands, 238 hectares. Property was worked, 1886, by Col. C. Greene.

TA LUCIA SYNDICATE, LTD. **CHILE.**

Office: 4 Copthall Chambers, London, E. C., Eng. Mine office: Los An- , La Ligua, Aconcagua, Chile. H. K. Paxton, director; F. E. Hodges, secre- Organized Dec. 24, 1906, under laws of Great Britain, with capitalization 00, shares £1 par; issued, £5,570, fully paid. Property was an option on er mining claims on the Canaveral Estate, near Los Anjeles, which option id to have been surrendered.

IPAÑÍA MINERA SANTA RITA. **MEXICO.**

Office: Chihuahua, Chih., Mex. Mine office: Santa Barbara, Hidalgo, uahua, Mex. Alberto Terrazas, president; Miguel Horcasitas, manager. erty is the Santa Rita mine, in the Chorreras Mountains, showing ore car- g values mainly in copper.

IPAÑÍA MINERA SANTA ROSA. **MÉXICO.**

Mine office: Mazapil, Zacatecas, Mex. Lands, showing copper ore, were er development at last accounts.

IPAÑÍA MINERA BENEFICIADORA DE SANTA TERESA, S. A. **MEXICO.**

Office: Mexico, D. F. Mine office: Coyuca de Catalán, Mina, Guerrero, Organized Apr. 30, 1897, under laws of Mexico, with capitalization 00 pesos. Property is the Santa Teresa mine, in the Mina district, carry- rgentiferous copper ores.

IEDAD MINERA SANTO DOMINGO HUACHUAMACHAY. **PERÚ.**

Mine office: Morrococha, Junin, Peru. Mine has a vein of 60 to 70 centi- rs width, traceable circa 400 meters, with irregular mineralization, carry- rgentiferous copper ores, developed by 4 tunnels, at distances of 40 to 60 rs vertically. Product is exported to Liverpool for reduction.

9.1% copper. Company apparently is devoting its attention mainly to tion of its asbestos claims.

N TWELVE EXPLORATION CO. **MICHIGAN.**

ce: Hancock, Mich. Mine office: Houghton, Houghton Co., Mich. M. hell, agent; Jas. P. Edwards, engineer. Capitalization $20,000, shares convertible into shares at subscription price in case of the organization ning company to succeed the exploration pool, which is not incorporated. 440 acres, held under option, adjoining the Isle Royale on the southeast, g the Lynch farm, lands being in Section 12, T. 54 N., R. 34 W. and 6 and 7, T. 54 N., R. 33 W. Company is boring with diamond drill northern extension of the Baltic lode, and secured, November, 1909, r-bearing drill core, but experienced much delay from caving ground. y considered promising.

ITY GOLD & COPPER CO. **WYOMING.**

ne office: Atlantic City, Frémont Co., Wyo. Lands, west of Atlantic ow a vein of 20′ estimated width, carrying ore said to give good gold

ITY MINING & DEVELOPMENT CO. **MONTANA.**

ne office: Princeton, Granite Co., Mont. Lands, 5 claims, near the n group, showing a porphyry dyke of 130′ estimated width, in lime- vith entire dyke claimed to carry average values of 15 oz. silver, with d and copper values. Mine, opened to depth of 175′, shipped 15 car- ore during development, having average assays of 2.98% copper, 7.5% .7 oz. silver and 40 cents gold per ton.

ANZA MINING CO., S. A. **MEXICO.**

ce: Apartado 295, San Luis Potosí, Mex. Mine office: Zacualpam, , Mexico, Mex. G. Waddill, president; preceding officer, F. C. Doty, C. ggerhoff, E. Lavin and Pedro Barcena y Trueba, directors; A. Kraemer, sario. Organized 1907, under laws of Mexico, with capitalization 300,000 hares 10 pesos par. Lands, 25 hectares, an antigua mine, said to have rked in the Sixteenth Century, near Zacualpam, adjoining the Carbon- ne, carrying 7 defined veins, opened by about 1,500 meters of tunnels, o tunnel exploiting a vein of about 35′ width, said to carry 1 to 3 kgs. nd 4 to 10 grams gold per ton. Company also owns copper claims, car- uriferous and argentiferous copper ore, in the state of Michoacán, which tly are idle. Company was said, 1908, to have ordered a 120-ton mill.

OR GOLD MINING & MILLING CO. **COLORADO.**

ne office: Breckenridge, Summit Co., Colo. M. M. Howe, manager. y carries auriferous and argentiferous copper ores, with values mainly in ious metals. Equipment includes a small steam plant.

ROCK MINE. **CALIFORNIA.**

ice: P. O. Box 117, Placerville, Cal. Mine office: Greenwood, El Co., Cal. Lle. H. Wilkins, owner and manager. Lands, 28 claims, area es, in Section 26, and 12 claims, area 150 acres, patented, in Section 24, N., R. 9 E. Property, well watered and timbered, is 3 miles from Green- in the Foothill copper belt, and is about equally distant from Auburn acerville. The tract carries about 4,500′ of the strike of a copper ore aving a hemitite footwall and porphyry hanging-wall. Several prospect show the continuity of the ore body, which is sulphide, estimated to aver- out 6% copper, with fair to good gold and silver values. Developments the 80′ Lipton tunnel, showing an ore body of 2′ to 4′ width, giving up to 4% copper, 12 oz. silver and $10 gold per ton, and the 180′ Dundee in ore, breasted in a vein of about 4′ width carrying a 2′ paystreak g good values in copper, gold and silver. The floor of the Dundee tun-

nel gives ore assaying 4% copper, 12
some ore assaying up to 8% copper, 12

SHASTA COUNTY EXPLORATION CO

Office and mine: Redding, Shasta
Lands, 760 acres, adjoining the Balakla
under bond from the Onn Copper Minin
aggregate length. Report of the compa
per ore were cut, 1909, in tunnel No. 7.
last accounts.

SHOOFLY MINE.

Mine office: Quincy, Plumas Co., C
Lands, 21 claims, on the north bank o
quartz schist, with nearly vertical di
porphyry to the east. The schist is est
rying mainly bornite, with some azurite
ring in minute sheets and lenses betwee
schists. Property has numerous trenche
ment work was in progress at last accou

SHOSHONE MINING & MILLING CO

Office and mine: Wallace, Shosho
dent; Jos. F. Whelan, secretary; Boyd
superintendent. Lands, 6 claims, on Ni
160′ shaft with a 400′ drift. Operation

SHYLOCK MINE.

Owned by Central Arizona Copper C

SIBERIAN PROPRIETARY MINES,

Office: 20 Copthall Ave., London,
Semipalitinsk, Siberia. J. C. Williams
Khikoff, J. D. Cohn and Heyman Irl
Hooper & Speak, consulting engineers.
Great Britain, with capitalization £13
fully paid, including £65,000 to vendo
of gold claims, east of the Suvunduk riv
Orenburg, Russia, which options were
an option and lease on several copper
trict, some of which have been sold.

SIERRA MADRE MINING & DEVEL

Office: 500 North Sixth St., St. L
Sinaloa, Mex. W. C. Harlan, president
wick, consulting engineer. Property, sh
ore, was under development at last acco

SILVERHORN MINING CO.

Office: Salt Lake City, Utah. Min
Claud W. Freed, president; R. G. Wilso
and treasurer; preceding officers, Hugh
ganized May, 1909, under laws of Utah
cents par. Property is in the North St

SILVER ROCK MINING CO.

Office and mine: Wallace, Shoshon
Lands, 9 claims, between the Argentine
the Oregon Railway & Navigation line,
heavy iron outcrop carrying gray coppe

SILVER SEAL MINING CO.

Mine office: Pilares de Teras, Mo
superintendent. Work was begun, ear

l ore assaying up to 15% copper and 400 oz. silver per metric ton. Up ust, 1909, company shipped, by pack trains, 15 miles to Nacozari, about worth of ore, said to have given smelter returns of $75 to $90 per metric roperty considered promising.

R SPUR PROPRIETARY, N. L. **AUSTRALIA.**

ine office: Silver Spur, Stanthorpe Co., Queensland, Australia. Property mediately south of the Silver Spur mine. Presumably idle.

MOUNTAIN COPPER CO. **ARIZONA.**

ine office: Johnson, Cochise Co., Ariz. Edward Ball, manager. Was de- ug with a small force at last accounts.

SELSKABET SKANDIA KOBBERGRUBER. **NORWAY.**

ine office: Narvik, Tromsö, Norway. Property includes copper claims fjord, Salten and Nordreisen, Tromsö, and pyrite claims at Ofoten.

UTTLE MINING CO. **BRITISH COLUMBIA.**

ine office: Jedway, Queen Charlotte Island, B. C. Property is on by Island. Presumably idle.

KUM COPPER CO. **WASHINGTON.**

ine office: Cle Elum, Kittitas Co., Wash. Property was under develop- vith a considerable force, and management planned a 250-ton concentrator accounts.

UNA MINING CO. **COLORADO.**

ine office: Idaho Springs, Clear Creek Co., Colo. Rufus C. Bonney, gen- anager. Lands are the Sun and Moon group, formerly owned by the Sun n Mining & Milling Co. The mines carry auriferous and argentiferous and lead ores. Equipment includes steam and electric plants, a Leyner npressor and a 50-ton cyanide plant.

RA CONSOLIDATED MINES CO. **MEXICO.**

ffice and mine: Hermosillo, Sonora, Mex. Max Müller, president; Herman er, general manager; Hon. Victorano Aguilar, secretary. Organized 1909, apitalization $2,000,000. Lands include about 20 different groups, adja- o the new line of the Southern Pacific, showing ores containing gold, copper and mercury.

HERN NEVADA COPPER CO. **NEVADA.**

ffice: Blackfoot, Idaho. Mine office: Gold Butte, Lincoln Co., Nev. Hardy tts, president; John W. Jones, secretary and treasurer; Orange W. Earle, er. Capitalization $750,000, shares $1 par. Lands, 6 claims, showing a on blowout carrying copper carbonates and sulphides, said to exist in e quantities. Development is by a 185′ tunnel.

HERN OREGON CO. **CALIFORNIA.**

ine office: Hutton, Siskiyou Co., Cal. Horace Monroe, manager. Develop- is by tunnels, longest, of circa 400′, showing a main vein of 7′ to 10′ ted width, carrying sulphide ore said to assay 4 to 5% copper, 5 oz. silver 2.80 gold per ton.

HERN SULPHUR ORE CO. **ALABAMA.**

ffice: Atlanta, Ga. Mine office: Pyriton, Clay Co., Ala. W. T. Williams, intendent. Property is a mine producing cupriferous and slightly rous and argentiferous iron pyrites. Equipment includes a steam plant. employs about 50 men.

H LAKE MINING CO. **MICHIGAN.**

ffice: 68 Devonshire St., Boston, Mass. Mine office: Greenland, Ontonagon ich. John C. Watson, president; F. W. Morandi, secretary and treasurer. ized 1863, under laws of Michigan, with capitalization $1,000,000, shares r, as the Aztec Copper Co., and title changed, Aug. 9, 1909, to South Lake g Co., at which time capitalization was increased to $2,500,000, shares $25 Outstanding shares of old company were $4.60 paid in. Of the 60,000 new

shares, 20,000 were issued at $2 each, in August, 1909, to sha record, in proportion to their holdings, thus raising $40,000 for oper

Lands, 320 acres, being the W. ½ of Section 31, T. 51 N., R. 1,214 acres of agricultural and timber lands, in Sections 10, 12 and 1 R. 38 W. Work was begun on the property in 1862, and the mine ha mill in early days, producing 756,863 lbs. fine copper, of which 10 secured in a single mass. Exploratory work was done, 1905-19 Knowlton lode of this property by the Aztec-Algomah Development mond drill borings were begun September, 1909, starting work at t Evergreen Bluff, near the footwall of the Evergreen belt, thence wor ward toward the Eastern sandstone. Property, though small, is co have good prospects of locating the Lake amygdaloid.

SOUTH MOUNTAIN COPPER MINING CO. M

Mine office: Smithsburg, Washington Co., Md. Warren H. Go ager. Organized 1907, under laws of Delaware, with capitalization shares $1 par. Lands, 80 acres, 3 miles southeast of Smithsburg, of South Mountain. Property, under development by tunnel, is sa native copper, and has secured good copper assays, with fair gold values, and the precious metals are said to exist in sufficient quanti copper without cost, which possibly may not prove the case, inasm not the case in any other copper mine.

SOUTHWEST CONSOLIDATED MINING & MILLING CO.

Office and mine: Farmington, Davis Co., Utah. J. D. Wood J. H. Robinson, vice-president; J. H. Wilcox, secretary and treasure officers, David Hess and W. Crawford Anderson, directors; W. general manager. Capitalization $30,000, shares 10 cents par. Pro contact deposit, with quartzite hanging and gneiss footwall, dev 345′ tunnel, showing a 40″ vein carrying ore said to average 1.5% lead, 2.5 oz. silver and $2 gold per ton.

SOUTHWESTERN DEVELOPMENT CO.

Office: 22 Congress Square, Boston, Mass. Mine office: Moctezu Mex. Capitalization $500,000, shares $1 par. Federal Trust Co., istrar. Lands are 9 claims in the Marius Mountain district o County, California, said to carry "stratas" of high grade ore, ma with some silver and gold, also 200 acres, known as the Casa Viej properties, in the district of Hermosillo, Sonora, Mexico, said to car fissure veins. Company also was said to have had an option on the mine of the Travers-Durkee Coppers, but apparently same was no Property was boomed systematically by M. C. Barnard & Co., of unc from 10 cents to $1.06 per share, whence it slumped back promptly the market sponsers going broke. Is not regarded favorably.

SPANISH PROSPECTING CO., LTD.

Office: 151 Cannon St., London, E. C., Eng. J. B. White, cha ceding officer, Wm. C. Punchard and Stephen Vivian, directors; Hopper, secretary. Organized May 14, 1901, under laws of Great B capitalization £20,000, shares £1 par; issued, £10,817, of which 6,01 fully paid and 4,800 are 13s. 6d. paid in. Property is 1,152 shares Copper Co., Ltd., and £3,840 debentures of Esperanza Copper & S Ltd.

SPECIE PAYMENT GOLD MINING CO. C

Office: 752 Equitable Bldg., Denver, Colo. Mine office: Idah Clear Creek Co., Colo. A. M. Welles, general manager; A. E. Simps tendent. Mine carries auriferous and argentiferous copper ores, mainly in gold. Equipment includes an electric plant, air-compr 20-stamp mill.

ER MOUNTAIN TUNNEL CO. COLORADO.
ne office: Eldora, Boulder Co., Colo. J. A. Gilfillan, superintendent. developed by tunnel, carries auriferous and argentiferous copper ores. ent includes a steam plant and air-compressor.

G CREEK MINE. AUSTRALIA.
ine office: Melrose, South Australia. Lands, 11 claims, on the bank of Creek, north of Melrose, on the northern flank of Mount Remarkable. ty has country rocks of clay-slate and sandstone, giving a strong sur- howing of copper ores, including cuprite, azurite and malachite and ional native copper. Ore is bunchy, being mainly cuprite, malachite tetrahedrite, associated with iron, and a general sample of ore from the gs gave 4.9 to 8% copper. Development is by a 140′ shaft and a tunnel. roperty is said to have yielded considerable ore in early days, and a r was built nearby, on the Melrose road. Production, 1907, was 70 long f ore returning 5 to 15% copper.

RE DEAL MINING & MILLING CO. ARIZONA.
ffice: Marquette, Mich. Mine office: Cave Creek, Maricopa Co., Ariz. any was organized, 1907, by A. Manthei, Frank E. Withey and Geo. E. h. Lands, 15 claims, 5 miles from Rogers Springs. Presumably idle.

NDARD CONSOLIDATED MINING CO. UTAH.
Office: Provo, Utah. Mine office: Cedar City, Iron Co., Utah. J. W. Will- n, president; F. B. Clark, vice-president; Geo. Schultz, secretary and urer; preceding officers, J. R. Richards and Monroe Clark, directors. Organ- circa October, 1909, under laws of Utah, with capitalization $250,000, s 25 cents par. Lands, well timbered, near Sand Springs, above the heads allion and Chloride cañons, in the Antelope range, carry a vein claimed to age 194′ between walls, also claimed to give surface ores averaging 3 to 8% er, 8 to 33% lead and $1 to $9 gold per ton, but the company's claims are dered excessive.

CESS MINING CO. COLORADO.
Mine office: Alma, Park Co., Colo. E. O. Moynihan, superintendent. Prop- carries auriferous copper ore, and has a small steam plant.

FIELD & KING MINES. QUEBEC.
Owned by A. O. Norton, at Suffield, Sherbrooke Co., Que.

MIT GOLD & COPPER MINING CO. WASHINGTON.
Office: Spokane, Wash. Mine office: Rockcut, Ferry Co., Wash. N. T. on, president and general manager; Stephen Tanner, secretary and treas- Lands are 2 groups, known as the Railroad and Summit claims. The mit group, 7 claims, has a 110′ tunnel crosscutting a vein of 25′ estimated ge width, and also has a 7′ vein, said to carry $10 gold per ton. The ad group, between Rockcut and Laurier, shows a vein of 25′ estimated , showing 4′ to 5′ of chalcopyrite of smelting ore, and about 20′ of ore of ntrating grade, opened by a 147′ incline shaft.

NYSIDE COPPER MINING CO. AUSTRALIA.
Mine office: Marodian, Queensland, Australia. Mine has shafts of 60′ and nd an opencut, and in 1907 shipped 12 long tons of ore giving average er returns of £17 7s. 6d. per ton, of which 2 tons returned 14% copper. at last accounts.

SET MINING & DEVELOPMENT CO. WASHINGTON.
Mine office: Northport, Stevens Co., Wash. H. W. Working, superintendent. s carry auriferous and argentiferous copper ores, under development with n power and a small force at last accounts.

ERIOR COPPER MINING CO. WASHINGTON.
Mine office: Chewelah, Stevens Co., Wash. Property carries 3 veins, of h 1, of 14′ width, is opened by a 600′ crosscut tunnel, showing auriferous

been bought for $75,000 cash and 15,000 shares of full
began business with about $125,000 cash, statement a
showing $76,389.86 cash on hand. First National B
Annual meeting, third Monday in November. The pro
of $1 paid stock for their services.

Lands, 13 claims, area 250 acres, including the Ma
adjoining the Mineral Farm group of the Globe Mini
claim, of several acres area, carrying the outcrop, a
The property, 2 miles northeast of Globe, is in the east
district, lying north of the Arizona & Michigan and no
the Globe Mining Co. and the Yuma mine of the Old D
the Yuma-Big Johnnie-O'Dougherty fault. The outcro
the Superior & Globe lands, shows an iron gossan ca
circa 3,000'.

The property has several old shafts, of 50' to 60'
worked for gold in the past, but present management
3-compartment shaft, sunk vertically in the hanging o
shaft, started circa March, 1909, on the Copper Trus
three-quarters of a mile from the terminus of the Ariz
with an easy grade available for extension of the lin
with 10x10" timbers, and was 552' deep at the en
sinking, the shaft cut a 5' vein carrying iron and copp
called for crosscutting at depth of 500', but plans were
be sunk to the permanent water-level before beginning

Equipment includes a 25-h. p. hoist, good for 700', a
compressor. There are 5 buildings, including a smithy
house, office and dwelling.

SYNDICATE MINING & EXPLORATION CO.

Office: Wardner, Idaho. Mine office: Kellogg, Sh
Shields, president; F. M. Barker, secretary. Capitalizat
par. Lands, 6 claims, showing, at surface, a 15' fissu
by a 325' tunnel, developing ore giving good assays in

COMPAÑÍA MINERA DE COBRES EN TAMAULIPA

Mine office: San Carlos, Centro, Tamaulipas, Me

, with combined gold and silver values in excess of the copper. Com-
s utilizing an available water power, and at last accounts planned
smelter, to do a custom business, in addition to treating the com-
n ores.

CONSOLIDATED MINING CO. **UTAH.**
Provo, Utah. Mine office: Lucin, Box Elder Co., Utah. Wilford F.
ident; Thos. W. Walsh, vice-president; Chas. M. Roberts, secretary
rer; preceding officers, John T. Roberts and B. M. Roberts, directors.
circa October, 1909, under laws of Utah, with capitalization $50,000,
nts par.

MINE. **CALIFORNIA.**
care of Graves Bros., owners, Philadelphia, Pa. Mine office: Tecopa,
al. Jas. Lester, manager. Lands, 4 miles west of Tecopa, formerly
part of the holdings of the Greenwater & Death Valley Copper Co.,
segregated. Owners are said to plan building a spur to the mine
onopah & Tidewater railway, 5 miles east, and also to plan a small

INING & MILLING CO., LTD. **IDAHO.**
and mine: Kellogg, Shoshone Co., Idaho. J. B. Cox, secretary; John
perintendent. Capitalization $1,000,000, shares $1 par. Lands, 5
a millsite, 1 mile east of Kellogg. Property shows a vein of 4' to 10'
rface, carrying lead and copper ores, with quartz gangue. Mine has
nnels of 100' and 200', latter planned to be driven to 700' length, in
t a ledge with a back of 400'. Improvements include several small
ings.

A EXPLORADORA DE TEJAMÉN. **MEXICO.**
ffice: Tejamén, Durango, Mex. Ulysses Matthey, general manager.
arrying auriferous and argentiferous copper ores, was under develop-
a small force at last accounts.

MINING & SMELTING CO. **NEVADA.**
ffice: Tenabo, Lander Co., Nev. Organized January, 1909. This
lanned taking over the property of the Gem Consolidated Mining
areholders of latter brought suit and asked for a receiver for the
lidated.

EE-SONORA COPPER CO. **MEXICO.**
Chattanooga, Tenn. Operating office: Douglas, Ariz. Mine office:
Arizpe, Sonora, Mex. Lands are 10 miles southeast of Douglas.
lanned beginning development work circa September, 1909.

TESORA. **MEXICO.**
ffice: Calmallí, Norte, Baja California, Mex. Emilano Ybarra, owner
r. Property carries ores of gold, silver and copper, and is equipped
m plant and 10-stamp mill, employing about 25 men.

) COPPER CO. **MEXICO.**
ffice: Rosario de Tesopaco, Alamos, Sonora, Mex. W. W. Harper,
ent. Lands are between Rosario de Tesopaco and Movas. Ore
shipped to Hermosillo.

N FALLS COPPER & MILLING CO. **MONTANA.**
ffice: Thompson, Sanders Co., Mont. S. A. Hurlbut, manager. Prop-
as the Copper Queen mine, which has shipped some rich ore in the
to have been bought of Fred M. Steele, circa 1909, for $100,000.

N MINING CO. **UTAH.**
Was merged, circa July, 1909, in Quincy-Thompson Consolidated
Formerly at Park City, Summit Co., Utah.

ING CO. **UTAH.**
ffice: Brighton, Salt Lake Co., Utah. W. I. Snyder, president.

Organized circa September, 1909, under laws of Utah, with c
$100,000. Lands, 22 claims, in the Bonanza Flat section, at the
Cottonwood Cañon. Company plans sinking a shaft and driving 2 t

THREE M. MINING CO.

Mine office: Shoshoni, Frémont Co., Wyo. Louis Herbst, su
Property shows copper ore, under development with a small f
accounts.

TIEWAUKEE LEASING CO.

Mine office: Bingham Canyon, Salt Lake Co., Utah. Geo. Belli
tendent. Is controlled, through stock ownership, by Scott Mines
is a lease on the Tiewaukee mine, an old silver-lead property of lo
which some ore was shipped, 1909, by the lessees.

TIGER GOLD CO.

Office: 184 La Salle St., Chicago, Ills. Mine office: Harrington,
Ariz. Andrew G. Sherer, manager; Stanton W. Forsman, superinte
erty is the Grey Eagle and Oro Bella mines, carrying auriferous
iferous copper ore, developed by 8 tunnels and a 400′ shaft. H
water power, with a 60-ton concentrator and 20-stamp mill, emplo
men. Production, 1907, was 19,010 lbs. fine copper, 9,937 oz. silver
gold.

TINTIC COPPER KING MINING CO.

Mine office: Eureka, Juab Co., Utah. Idle.

TINTIC DELMAR MINING CO.

Office: Provo, Utah. Mine office: Eureka, Juab Co., Utah. An
president; Harry Cluff, secretary and treasurer. Organized Marc
laws of Utah, with capitalization $100,000, shares 10 cents pa
claims. Presumably idle.

TINTIC HUMBOLDT MINING CO.

Mine office: Eureka, Juab Co., Utah. Thos. J. Pierpont, pre
talization $100,000. Shares are listed on the Salt Lake stock exch
10 claims, unpatented, in the North Tintic district, 3 miles fro
having a 75′ tunnel and an 85′ shaft.

TINTIC MAYFLOWER MINING CO.

Office: Provo, Utah. Mine office: Eureka, Juab Co., Utah. S
president; H. F. Thomas, vice-president; J. C. Anderson, secreta
urer; preceding officers, Hyrum Madsen and Rufus Babcock, direc
ized August, 1909, under laws of Utah, with capitalization $50,
cents par. Property is in the northern part of the Tintic district.

TINTIC MAYFLOWER MINING CO.

Office: Provo, Utah. Mine office: Eureka, Juab Co., Utah. W
president; Andrew Madsen, vice-president; Alfred F. Booth, secre
Rixon, treasurer. Organized July, 1909, under laws of Utah, with c
$100,000, shares 10 cents par. Property is in the northern part
district.

TISCH CREEK MINING CO.

Mine office: Nugget, Douglas Co., Ore. Property is a gold-copp
values mainly in gold, equipped with a small steam plant, 5-stam
small cyanide plant, employing about 15 men.

TOGO MINING & SMELTING CO. WA

Office: Spokane, Wash. Mine office: Chewelah, Stevens Co.,
Ibister, president; G. W. Brash, secretary and manager. C
$1,000,000, shares $1 par. Lands, 7 claims and 160 acres of miscella
in the Cedar Cañon district, developed by opencuts and tunnels
600′, showing chalcopyrite giving average assays of about 4% cop
ings include a smithy and cabins.

BUCHI MINE. JAPAN.
ine office: Wakagama-mura, Naka-gori, Japan. Production, 1907, was
lbs. fine copper.

LAND MINING CO. WYOMING.
ine office: Hazelton, Johnson Co., Wyo. Thos. G. Smith, superintendent.
ty shows auriferous copper ore. Equipment includes a small steam plant.
eveloping at last accounts.

TOPICS GOLD MINING CO. COLORADO.
ice: 215 McPhee Bldg., Denver, Colo. Mine office: Central City, Gilpin
olo. S. A. Josephi, manager; T. G. Martin, superintendent. Property
s auriferous and argentiferous copper ore, with values mainly in gold.
ment includes a steam plant.

ERSE CITY MINING CO. WYOMING.
ice: Traverse City, Mich. Mine office: Encampment, Carbon Co., Wyo.
DeKay, manager; A. H. Oldman, superintendent. Lands, 2 claims, adjoin-
e Great Lakes Mining Co., on the eastern slope of Green Mountain.

SURE MINING CO. NEW MEXICO.
ine office: Orogrande, Otero Co., N. M. Wilton H. Bartlett, president;
chtweih, vice-president; S. Howard Leech, secretary and treasurer; A. F.
ider, general manager; preceding officers and P. A. Holm, directors.
ized April, 1909, under laws of Arizona, with capitalization $600,000,
s $1 par. Lands, 4 claims, known as El Paso group, next west of the
e Carlo mine. Property has 2 fissure veins, crossing near the 70′ main
, which is said to show 5′ of ore assaying up to 21% copper and 200 oz.
per ton. Management was said, April, 1909, to have let a 2-year contract
levelopment.

S SEÑORES MINING CO. MEXICO.
Mine office: San Pedro Ocampo, Mazapil, Zacatecas, Mex. Property in-
s La Providencia and La Poderosa mines, near San Pedro Ocampo, yielding
that have given smelter returns of 10% copper, 3,234 grams silver and 120
s gold per metric ton.

ANGLE MINING CO. MÉXICO.
Office: 1251 Michigan Ave., Chicago, Ills. Mine office: Pesqueira, Ures,
ora, Mex. Hiram Baldwin, president; Winthrop Burdick, secretary; W. J.
lick, superintendent. Organized under laws of Arizona, with capitalization
,000, shares 50 cents par. Has a $25,000 bond issue, in denominations of
per bond, which the company was endeavoring, March, 1909, to sell at par,
ng 400 shares of capital stock as a bonus with each bond. Lands, 10
ares, about 25 miles east of Pesqueira, including the Rey Eduardo mine, said
e an antigua, and the Elena mine having an 80′ shaft and a 50′ drift said
how ore giving assays of 30 to 40% copper. Company claims to have 3
en properties, which seems doubtful, and advertised, March, 1909, that
in 3 months it could be shipping 5 cars of selected ore daily, averaging
es of $200 per ton, which seems something more than dubious. The com-
also advertised that it should be able to pay 4% monthly dividends, but
ends apparently have failed to materialize. Is not regarded favorably.

ANGLE MINING & DEVELOPMENT CO. MONTANA.
Mine office: Clinton, Missoula Co., Mont. Robt. B. Hughes, president and
al manager. Company bonded its property, circa January, 1909, to the
tana-Clinton Copper Co., but latter forfeited the bond, October, 1909, and
erty reverted to the Triangle company, after a payment of $15,000 cash
some stock in the Montana-Clinton. Lands, 11 claims, unpatented, well
ered and timbered, including the Triangle group of 6 claims and the Grass
ow group of 5 claims, in the Wallace district, about 2 miles northeast of
ton and 19 miles south of Missoula. Company also owns several blocks in

the townsite of East Clinton, and a
perpetual lease on the upper workings
half mile from the Triangle, at a roy
the ore, which seems a high percentag

Development is confined to the Tr
the others having any material showi
ment. The Triangle claim has a 450'
in tight granite, consisting of a few s
being unusually well defined, carrying
slightly altered for an inch or two al
the walls, and no evidence of moveme
sulphides being found even in the oxi
no indications of secondary enrichmen
bornite, and occasionally of chalcopyri
chalcopyrite, and as stringers in bun
tially chalcopyrite, with mineral occur
throughout the veins, but usually on s
correct hand samples, values being irr
from the ore-bin assayed 6.8% copper
The same vein, opened circa 400' south
2' wide. The Grass Widow, though hav
has a better showing than the Triang
and an Ingersoll-Rand air-compressor.
log ore-bin.

COMPAÑÍA MINERA DE LA TRIN

Mine office: Ayutla, Autlán, Jali
carries auriferous copper ore, and is s

COMPAÑÍA MINERA LA TRINIDA

Office: Espalda de Santa Veracruz
Moctezuma, San Luis Potosí, Mex.
Organized under laws of Mexico, with
pesos par, increased by a later issue
pesos paid in. Property is the San A
copper, with values mainly in gold an

TRIXEY COPPER MINING CO.

Mine office: Phoenix, Maricopa C
Organized 1909, with capitalization $
Phoenix, has a 50' shaft, and shows
lowed by increased quantities of copp

TROJAN MINING CO.

Mine office: Ballarat, Inyo Co., C
about 15 miles from Ballarat, showing

TROUT CREEK MINING CO.

Mine office: Trout Creek, Juab C
Lands, many miles from a railroad, ca
zinc, bismuth, silver and gold. Is und

TSUBAKI MINE.

Mine office: Nishitate-mura, K
Takeda, owner and manager. Equipme
ing 1,453 h. p. Employed, 1907, an av
was 192,845 lbs. fine copper and 448,80

TURKEY CREEK MINING & DEVEL

Dead. Officers were H. J. Freede
dent; M. J. Donahoe, secretary and tre
organized March 2, 1909, under laws o

= $2 par, and was merged, 1909, in the Bernoudy-Turkey Creek Co. Former was at Douglas, Ariz. Formerly at Paradise, Cochise Co., Ariz.

N CITY MINING & MILLING CO. **MONTANA.**

Mine office: Elliston, Powell Co., Mont. Samuel Moore, superintendent. rty carries auriferous and argentiferous copper ores, and has a small steam . Was developing with a small force at last accounts.

E SWANE COPPER MINE, LTD. **BRITISH COLUMBIA.**

Mine office: Duncans, Vancouver Island, B. C. Company did considerable ond drilling, 1909, at North Vancouver, and is said to have located a good of chalcopyrite thereby.

LE JOE MINING CO. **UTAH.**

Mine office: Goshen, Utah Co., Utah. J. H. Weber, general manager. Lands, cres, near Goshen, which company planned, September, 1909, testing by drill. Previous developments have shown streaks of high grade copper

EDA MINING CO. **ARIZONA.**

Office and mine: Globe, Gila Co., Ariz. Samuel Seelig, president; T. L. , vice-president; C. W. Cross, secretary; preceding officers, J. F. Mayer, ne Barrows, G. W. Leonard, Wade Stowell and C. W. Cross, directors. nized April, 1909, under laws of Arizona, with capitalization $1,000,000, s $1 par. Lands are 18 claims, on the Troy road, 6 miles southwest of , having a 40′ shaft and a 35′ tunnel showing sulphide ore assaying 7.63% r, 1 oz. silver and $1.40 gold per ton.

KURA MINE. **JAPAN.**

Mine office: Iwate, Rikuzen, Japan. Jiro Sato, owner. Employs circa 125 . Production, 1907, was 145,979 lbs. fine copper.

PAÑÍA MINERA LA UNIÓN. **MEXICO.**

Mine office: Jimulco, Viesca, Coahuila, Mex. Employs circa 10 men. Prop- ncludes El Esfuerzo, Ampliacion de Providencia and other groups, pro- g mixed ores carrying mainly copper values.

PAÑÍA MINERA LA UNIÓN. **MEXICO.**

ffice: Guanajuato, Gto., Mex. Mine office: Silao, Guanajuato, Mex. M. o, president; F. Arellano, secretary; Roberto Fernandez, consulting engi- Organized under laws of Mexico, with capitalization 60,000 pesos, shares sos par. Lands, 24 hectares, carrying auriferous and argentiferous copper planned to be developed by a 100-meter shaft.

N DEVELOPMENT CO. **CALIFORNIA.**

ffice: Boston, Mass. Mine office: Johannesburg, Kern Co., Cal. Lands , known as the Juanita, in the Morrow district, 26 miles southeast of nesburg, showing 3 veins, about 30′ apart, said to have granite hanging and limestone footwalls, which presumably is meant for the general hanging of the 3 veins as a whole, showing gossans of 2′ to 12′ laid by veins that widen with depth. Mine has shafts of 40′, 60′, 80′ and deepest showing copper sulphides with talcose gangue, said to aver r and $3 gold per ton.

TED SMELTERS, RAILWAY & COPPER CO. **WYOMING.**

Office: Cleveland, Ohio. Mine office: Rudefeha, Carbon Co., Wyo. : Encampment, Carbon Co., Wyo. I. N. Pennock, president; J. F. president; Willard Pennock, treasurer; preceding officers, Warner , ouse, W. E. White, E. M. Cobb, F. A. Baldwin and A. S. Upson. Forrest, assistant secretary; Geo. H. Hand, general w Anderson, mine superintendent. Organized Feb. 10, 1909, ing, with capitalization $12,500,000, shares $10 par, ,000 non-cumulative 7% preferred stock, and $10,000,000 , $8,190,000 of common stock. Bonds, $2,500,000 authorized,

$2,100,000. This bond issue was put ou
Copper Co., of which this company was
ferred stock is for the purpose of takin
the life of the bonds, or at the option o
was capitalized at $10,000,000, with $8,9
United Smelters Railway & Copper Co.
91% of the outstanding Penn-Wyoming
will be liquidated eventually. Clevelan
second Wednesday in February.

The company was said, March, 190
remaining due on the Ferris-Haggarty
to have finished paying the total indebte
to $1,390,798.62, principal and interest
amount actually paid was only $318,959.
balance actually due on the underlyin
which $1,072,839 had been paid previou
Smelters, Railway & Copper Co. was
capital of $250,000 in its treasury, but t
did not report its financial position in s
resumed operations, being idle, except
care for the property.

The property of the company will
1115, under title of Penn-Wyoming Cop

UNITED STATES MODERN MINING

Office: Bellingham, Wash. Mine off
19 miles from Glacier, on the headwate
tact ore deposits between granite-porphy
25′ in width, carries ore giving good
gold.

UNITED VERDE EXTENSION GOLD COPPER MINING CO.

Dead. Was reorganized as United
at Jerome, Yavapai Co., Ariz.

UTAH GLORY MINING CO.

Park City, Utah. Mine office: B
Simon, president; J. P. Langford, secre
ized circa December, 1908, under laws
shares 50 cents par. Lands are in Big

UTAH LEASING CO.

Office: Salt Lake City, Utah. Mine
Utah. J. C. Dick, president and gener
and treasurer; A. Thomas, secretary;
E. E. Price, directors. Organized circ
capitalization $30,000, shares 10 cents
of the old Telegraph mine of the United
beneath the old silver-lead stopes, oper
silicious ore, worth $6 to $18 per ton,
1909, company was shipping at the rat
Yampa smelter, which uses the ore for

UTAH METAL MINING CO.

Office: 161 Devonshire St., Boston,
Salt Lake Co., Utah. Samuel H. Treloar
tendent. Was promoted by Walter B.
of the Bingham Metal Co., and W.
Standard Copper Co. Organized 1909, u

,000, shares $5 par, as a merger of the Bingham Central Mining Co., am Standard Copper Co. and Bingham Central-Standard Copper Co., being a holding company controlling the two other corporations previously l. The new company gave the Bingham Central-Standard Copper Co. 0 shares of stock, or about 1 share for 3, leaving 785,000 shares in the ry of the new company. The Bingham Central-Standard had a $347,000 l indebtedness, and bond-holders have been given the privilege of con- g bonds into stock, within 2 years, on the basis of $2 per share, or may cash in 5 years instead. After providing stock for the conversion of the , there remained about 612,000 shares in the treasury, which the manage- planned underwriting at $3 per share, to provide a large working capital e extensive equipment and development of the consolidated property.

ands, circa 3,500 acres, including mineral lands and extensive timber , with a millsite, and a water-right estimated as capable of developing h. p. Company's holdings extend from Carr Fork Cañon, in Bingham n, over the divide of the Oquirrh range into Middle Cañon, Tooele County, Property includes former holdings of the Bingham Metal Mining Co., am Metals Co., Bingham Central Mining Co. and Bingham Standard r Co. Lands of the Bingham Metal Mining Co. and Bingham Metals Co., e Tooele side of the divide, were circa 1,300 acres, in Middle Cañon, timbered and having a saw-mill. The Middle Cañon lands show a lime- belt much similar to that on the Bingham side of the divide. The Tooele , in Middle Cañon, have 5 tunnels, No. 1 being 1,400′, No. 4 being 1,700′ No. 5 being 500′ in length. It is thought that the cupriferous porphyry ngham Canyon may extend to this property.

Tunnel No. 1 of the Bingham Metal group, about 3,000′ long, Sept. 15, is planned to cut entirely through the mountain, in a length of circa 0′. At a further distance of about 2,500′, this tunnel should cut into the issures of the Bingham Central-Standard group, and the tunnel will give k of circa 2,300′, vertically, at the deepest point, under the Ridge claim. el No. 1 is 9x9′ in the clear, and double-tracked, with a launder beneath vater, seepage of which is about 600 gallons per minute, which should be led by the completion of the tunnel. Tunnel was idle at last accounts, ing relaying of track with 35-lb. steel rails, and the construction of a new r house, electric plant and haulage system. By cutting through the entire o the Carr Fork side, No. 1 tunnel will afford drainage for the entire rty, also transportation facilities, and will tap, at depth, the ore bodies e Bingham Central-Standard group. This tunnel cost only a trifle above r foot for the first 3,000′.

No. 2 tunnel is located about one mile down the cañon from No. 1, and vertically lower.

The Carr Fork property, in the Bingham Canyon district, adjoins the n Consolidated, Utah Consolidated and Bingham-New Haven properties, includes the Bingham Central and Bingham Standard groups, carrying 3 vein systems, known as the Saginaw, Burning Moscow and Nast, each able for a distance of circa 4,500′, and all intersected by the Old Jordan . Property also carries several smaller lead veins.

Lands of the Bingham Standard Copper Co. were 320 acres, partly pat- l, developed by the Saginaw tunnel, and the mine is said to have produced 000 worth of ore under a former management, shipping some ore in 1907. The lands of the Bingham Central Mining Co. were 190 acres, patented, loped by 2 tunnels, known as the upper or Whiteley tunnel, and the lower ff Davis tunnel, with about 9,000′ of workings.

The Whiteley or upper tunnel, of about 2,000′ length, shows mainly silver-

lead ore, and has about 500' to drive to reac
be tapped at depth of about 150' below the L

The Jeff Davis or lower tunnel, of circa from the portal, a vein of sulphide concentrat with small gold and silver values, and at a di lead vein, of 2' to 8' width, carrying a consid with copper values of 2 to 5%. In 1908 this of 3' to 4' width, giving assays of 12% coppe lead ore of good average tenor.

The Amelia tunnel, with portal about 17 tunnel, shows a vein of about 75' estimated s of circa 90', carries low grade concentrating copper and $1.50 gold per ton, with small sil

The Deems tunnel, from Log Fork, is an a strong vein carrying some good ore.

The Saginaw tunnel, about 700' long, fol showing 1' to 12' width of ore, from which made.

The Mountain Maid tunnel of the Bi about 950' in length.

The property includes a millsite in Midd tunnel, and has enough water developed for supply can be obtained from springs on th and it is planned to pipe water through the to Bingham Canyon, where water is needed.

Equipment includes small mining plants power plant in Middle Cañon has direct-con agement plans installing a heavy electric eq number of buildings at the various properties and mill is about 4 miles from the Internati

The Utah Metal Mining Co. is an ambiti acreage of land, but has a number of proper devoid of promise, though it will require a erty adequately.

UTAH MINES COALITION CO.

Office: Salt Lake City, Utah. Mine o Duncan McVichie, president; Jas. B. Risque, land, secretary and manager; Louis H. Farns and E. G. Woolley, Jr., directors. Organiz Utah, with capitalization $1,250,000, shares pany has authorized a bond issue of $200,000, nations of $100, dated March 3, 1909, payabl

Lands, 15 patented claims, 4 fractional, Cañon, including the entire holdings of the said to carry 4 strong fissure veins and a con shaft, and a 345' tunnel driving on the nort therefrom to the 4 other veins. This tunnel when completed. Equipment includes an 80

UTAH-PHILADELPHIA MINING CO.

Mine office: Alta, Salt Lake Co., Utah. Cottonwood Cañon, have 2 tunnels and the ore assaying 8% copper, 62% lead, 32 oz. si vein is being developed by a lower tunnel, t the vein.

OMIYA MINING CO. **JAPAN.**
e office: Mihara-mura, Itsuki-gori, Bitchu, Japan. Mine, having no lant, employed 666 hands in 1907. Production, 1907, was 80,531 lbs. ,201 oz. silver and 30 oz. gold, in addition to 3,470,931 lbs. of auriferous entiferous copper ore, giving total production for 1907 estimated at lbs. fine copper.

NONI. **PERÚ.**
e office: Casapalca, Oroya, Perú. Property, in the vicinity of Backus ton, employed 30 men, at average wages of 1 peso daily, in 1907. Pro- 1905, was 300 metric tons of ore, yielding 99,207 lbs. copper and 390 er, and production, 1907, was 700 metric tons of ore, averaging 14% nd circa 1,200 grams silver per ton, returning 216,050 lbs. fine copper kgs. silver.

KYSSHTIM WORKS. **RUSSIA.**
ed by Kyshtim Corporation, Ltd., at Kyshtim, Perm, Russia.

COPPER MINING CO. **ARIZONA.**
e: 303-167 Dearborn St., Chicago, Ills. Mine office: Jerome, Yavapai z. W. P. Cooper, president; E. C. Weatherley, vice-president; John general manager; J. J. O'Donohue, secretary and treasurer; J. P. superintendent. Organized January, 1904, under laws of Arizona, pitalization $3,000,000, shares $1 par, as North Verde Copper Co., and anged, January, 1909, to present title. Lands, 6 claims, area 120 acres, United Verde, having a 375′ shaft, which management planned sinking of 1,000′, and a 250′ tunnel, latter showing calcspar, iron and soft rock, e of circa 150′ width, with a very little ore carrying 2.5% copper and ver per ton, with a trace of gold. Equipment includes a 70-h. p. boiler, Fairbanks & Morse double-cylinder hoist and an air-compressor. Lands mped, January, 1908, but company claimed that assessment work was perly, and jumping illegal, and apparently won out on this contention. was idle for more than 2 years, until March, 1909, when it was stated rk was about to be resumed, but property apparently has remained idle.

MINING CO. **UTAH.**
e office: Alta, Salt Lake Co., Utah. Lands, 7 miles from Alta, in the district, near the mouth of Little Cottonwood Cañon, are 6 claims, but is in litigation with the Great Copper Flat Mining Co. over ownership of these claims, and possibly may be consolidated with the Copper Flat. ably idle.

COPPER CO. **PENNSYLVANIA.**
ce: York, Pa. Mine office: Charmian, Franklin Co., Pa. J. H. Dechert, t; H. S. Wiest, treasurer; C. E. Wills, general manager. Capitalization . Lands, about midway between Charmian and Gladhill, in the Blue lountains, show ore giving assay values of $25 to $600 per ton in native silver and gold. Mine has a 200′ shaft, sunk at an angle of 47°, and drilling was begun, July, 1907, this including 4 holes, of 165′ to 800′. ent includes a hoist and air-compressor.

NIA DEVELOPMENT CO. **MEXICO.**
e office: Fronteras, Arizpe, Sonora, Mex. W. B. McBride, president; , manager. Lands, 32 hectares, near the Cabullona mine, having a 40′ aid to show native copper and mixed carbonates, claimed to give average f 26% copper, 30 oz. silver and $4.96 gold per ton.

N COPPER CO. **ARIZONA.**
ce: Prescott, Ariz. Mine office: Jerome, Yavapai Co., Ariz. Chas. T. president; W. S. Norvell, secretary; Jos. Larsen, superintendent. Capi- n $3,000,000, shares $10 par. Lands, 8 claims, partly fractional, area , in Deception Gulch, surrounded by the United Verde, Hull, Haynes

and Verde Grande properties. Mine is being developed by tunnel giving a lea of about 300′, and management has planned sinking a 2-compartment shaft, t connect with the tunnel.

WALLABY COPPER MINES, LTD. AUSTRALIA.

Office: 17 Abchurch Lane, London, E. C., Eng. Mine office: Northampton Western Australia. B. Argall and A. E. Powell, directors. Organized Feb. 3, 1909, under laws of Great Britain, with capitalization £20,000, shares 1s. pa Lands, 100 acres, freehold, known as the Wheal Fortune Extended mine, formerly held by Wheal Fortune Extended, Ltd. The company claims to have a lead vein of 3′ 6″ width, and to have raised therefrom 20 tons of ore returning 70% lead. Company also claims to have ore running as high as 40% copper. Property was idle for many years. Company's prospectus claims entirely too much, and the corporation is not regarded favorably.

WALLA WALLA COPPER MINING CO. WASHINGTON.

Office: Walla Walla, Wash. Mine office: Keller, Ferry Co., Wash. Lands are near Keller, in the southern half of the Colville reserve. Considerable work has been done on the property, and ore of fair assay grade in copper and gold was developed by former owners.

WANAMAKER MINING CO. IDAHO.

Letter returned unclaimed from former mine office, Mullan, Shoshone Co., Idaho. Jas. Taylor, superintendent. Lands, 6 claims, 2 of which are supposed to carry the extension of the Iron Spar vein, adjoining the Bullion on the north, said to have a fair copper showing. Idle.

WANIBUCHI MINING CO. JAPAN.

Mine office: Hatazako-mura, Kamoishi-gori, Iwami, Japan. Property is the Wanibuchi mine, employing circa 200 hands, without power installation. Production, 1907, was 38,658 lbs. fine copper, 2,339 oz. silver, 1,594,890 lbs. copper ore and 1,486 metric tons of zinc ore, of the total value of 32,986 yen.

WASATCH-UTAH MINING CO. UTAH.

Office: 221 Atlas Block, Salt Lake City, Utah. Mine office: Brighton, Salt Lake Co., Utah. A. W. Nieman, manager; Frank Rumel, secretary. Organized circa 1908, as successor of Consolidated Jefferson Gold & Copper Mining Co. Lands of old company were 49 claims, 7 fractional, and 40 acres of placer grounds for a building site, but property of present company is said to consist of 22 patented claims, near the mouth of Little Cottonwood Cañon. Property has a 1,400′ tunnel, with about a quarter-mile of workings, showing sulphide ores said to average circa 5% copper, with small silver and large gold values. Equipment includes a good machinery plant and necessary mine buildings. Was developing with a small force at last accounts.

WELLWOOD COPPER SYNDICATE. AUSTRALIA.

Mine office: Lucknow, N. S. W., Australia. Property is in Wellwood paddock, near Lucknow, and prospecting work was begun thereon, circa 1907.

WESTERN COPPER CO. NEWFOUNDLAND.

Mine office: York Harbour, Birchy Cove, Bay of Islands, Nfld. H. V. Smythe, general manager. Lands, 4 claims, area 6,400 acres, also 26,880 acres of timber lands, giving total holdings of 33,280 acres. Mining lands are located back of the Bay of Islands, on the western coast of Newfoundland. In addition to the York Harbour mine, company holds 2 additional areas having extensive surface indications of copper. Country-rock is diorite, carrying 12 known fissure veins in serpentine, of which 5, including one of 50′ width, have been more or less developed. The country-rock is a dark green to black serpentine, the serpentine having a generally northeast and southwest trend, with dip of about 73° southeast, carrying superimposed lenticular masses of low-grade chalcopyrite, practically conformable in trend and dip, the lenses having been

crushed or broken near surface, but occurring in solid masses of nd tons at depth.

rk Harbour mine, at the head of Eagle Nest brook, about 4,000' y, and at an elevation of about 1,000' above tidewater, carries pyrite, assaying 3 to 18% copper, with occasional zinc, up to 50% to 4 oz. silver and 40 cents to $1.40 gold per ton. The ore is com- se-grained, with average values of circa 4.5% copper and 38 to 41% sulphur being valuable for use in the manufacture of acid, after n of copper values. Development is by shafts of 54', 64', 70' and out one-half mile of workings, giving about 40,000 tons of ore in new series of lenses is under development. The 360' main shaft is ngle of 72° to the southeast, practically the same as the dip of the Levels are opened at 60' intervals, with drifts driven southwest, rike of the ore bodies. One shaft is idle, and the two others are ping and ventilating purposes only. Extraction is carried on by pes, averaging 10' to 30' in width, and timbering is with 12x12" iare sets.

fthouse has a crusher of 500 tons daily capacity, reducing ore to a 6" ring, whence it goes into cars on the main tramway, which g, with an elevation of 1,000', having a 36" gauge track, trains, f 2 steel 3-ton self-dumping cars, which are lowered by a hoist ore into a 2,000-ton pocket on the bay, to a double-tracked tunnel, f which are fitted with chute gates, connecting with the super- the pier, over which one-ton cars are trammed, delivering ore into he steamer. The facilities suffice for loading 700 tons of ore daily. nt includes a 250-h. p. steam plant, with a 50-h. p. Flory hoist l Norwalk high-altitude air-compressor. Improvements include an , boiler-house, sawmill and 15 dwellings. Property considered

MINES DEVELOPMENT CO. **ARIZONA.**

ice: Swansea, Yuma Co., Ariz. C. C. Davis, president; W. C. Row- esident; R. W. Baxter, secretary and treasurer; preceding officers, eller and F. A. Jones, directors. Organized April, 1909. Lands, e Central group, lying between the Clara and Moro groups of the idated, are 3 miles from Swansea and 22 miles from Bouse, and niles from the Bill Williams Fork River, the nearest source of sure .

MINING & LEASING CO. **UTAH.**

alt Lake City, Utah. Mine office: Frisco, Beaver Co., Utah. C. C. vice-president and treasurer; L. L. Nettleton, secretary; preceding Graham and E. Ben Brown, directors. Organized circa September, aws of Utah, with capitalization $25,000, shares $1 par. Property l lease on the Comet group, in the Frisco district.

NEVADA SMELTERS CORPORATION. **NEVADA.**

ffice: Carson City, Ormsby Co., Nev. Jas. Yerington, manager. e a millsite and the old Merrimac mill, in Carson Cañon, with water Carson River, circa 40 miles from Yerington, whence ores are be brought for reduction. Company also owns 280 acres of lands ore and limestone for fluxing. Company plans building a 250-ton blown in circa April, 1910.

PACIFIC GOLD & COPPER MINING & MILLING CO. **UTAH.**

alt Lake City, Utah. Mine office: Ogden, Weber Co., Utah. Thos. resident. Capitalization $1,000,000, shares $1 par. Stock is listed ake Stock Exchange. Lands, 12 claims, 2½ miles from a railroad,

in the Sierra Madre district, having a 150'
showing low grade sulphide copper ore ca
WESTERN ZINC MINING CO.

Office: French-American Bank Bldg.,
Ingot, Shasta Co., Cal. C. D. Maze, mana
mine, at Orange, Orange County, Californi
patented claims, known as the Donkey mine,
mine, and is supposed to carry a continua
which is a sulphide complex including aurife
galena and sphalerite. Property is an old r
done at intervals in the past, having a
Reynolds chemical works, in South San Fra
daily, owned by the same company.

WICKENBURG REDUCTION CO.

Works office: Wickenburg, Maricopa C
tendent; Jonathan Gordon, metallurgical e
planned building a custom sampling mill at

WICKLOW MINING CO.

Office: Salt Lake City, Utah. Mine off
Caldwell, president; A. J. Weber, secretary
officers, H. M. Dinwoody and W. F. Giles,
originally in 500,000 shares at $1 par, chang
par 50 cents. Lands, 6 claims, north of the
Development Co., having a 527' shaft.

WILLEY CANANEA COPPER CO.

Office: 50 Church St., New York, N. Y
Sonora, Mex. Gen. Henry Ide Willey, pres
Miller, vice-president; A. B. Wadleigh, sup
1909, with capitalization $10,000,000, shares

Lands claimed by company are about
rounded by holdings of the Greene-Canane
boldt Exploration Co., to have taken over
by the Greene Gold-Silver Co. Lands inclu
Cananea Copper Co., which was a consoli
Southwestern Mining Co., Red Cloud Coppe
Co. and Miller Mining Co. Lands formerly
Copper Co. were 1,729 acres, including the
and the Corregidor mine, area 741 acres,
southwest of Cananea, said to show a forma
the Greene Cananea. The Southwestern gr
western Mining Co., area 342 hectares, kno
southeast of La Cananea, is said to carry an
by a 150' shaft showing ores giving good ass
The Kansas-Cananea group, area 620 acre
shafts, one 110', and short tunnels, shows or
erty as a whole has about 4,000' of worki
wagon road to La Cananea. Company plann
at organization, but it cannot be learned th

WISCONSIN COPPER CO.

Mine office: Kellogg, Shoshone Co., Idah
Property is on the north side of the river,
between Kellogg and Osburn.

WOLVERINE COPPER MINING CO., LTD

Office: Wallace, Idaho. Mine office: M
Thompson, president and general manager

I. Baillie, M. B. Thompson and G. B. Cotrell, directors. Organized De- 1906, under laws of Idaho, with capitalization $1,000,000, shares $1 ands are east of Snowstorm. Presumably idle.

ING HILLS MINING CO. **WYOMING.**

ice and mine: Encampment, Carbon Co.,. Wyo. John J. Totten, presi- W. B. Dorsey, secretary; Leo Davis, agent; preceding officers, S. B. A. B. Tolen, Chauncey H. Clark, Chas. Chenny, Geo. Harding and John , directors. Organized September, 1909, under laws of Utah, with capi- on $300,000, shares $1 par.

PAI GOLD, SILVER & COPPER MINING CO. **ARIZONA.**

ne office: Crown King, Yavapai Co., Ariz. Property is the Crowned ine, in the Bradshaw Mountains, bought by present company from B. ner, receiver of the corporation formerly owning the property, for half in cash and half in shares. Lands are 18 claims, and mine has considerable producer, mainly of gold, in the past. Property has a p gold mill.

GTON MINES & EXPLORATION CO. **NEVADA.**

ne office: Yerington, Lyon Co., Nev. Otto Taubert, president; O. N. , secretary; preceding officers, August Taubert, C. S. Durand and Taubert, directors. Lands, 33 claims, in 4 groups, aggregating 23 copper and 10 gold claims, in Lyon and Douglas counties. The Taubert group, er claims, adjoins the Wabuska Copper Mines Co., and the Copper Flat claims, 1 mile east of Yerington, adjoins the Empire Copper Mines Co., f the Bluestone. Development is by a shaft, said to show ore carrying 200 gold per ton, and company plans building a mill at Nordyke, Lyon vada.

GTON NATIONAL COPPER CO. **NEVADA.**

ne office: Yerington, Lyon Co., Nev. I. A. Strosnider, secretary; C. W. er, treasurer; W. A. Johnson, superintendent. Capitalization $1,250,000, $1 par. Shares are listed on the Salt Lake stock exchange. Lands, 19 15 surveyed for patent, area circa 340 acres, adjoining the Western on the west and the Malachite on the south, about 1½ miles from the e of Mason and 12 miles from the Wabuska branch of the Southern Railroad, which line is surveyed to run across the property. Develop- by 2 prospect tunnels, of 100′ and 300′ length, and a 40′ shaft. Man- t plans development by a double-track tunnel, to be driven about a the vein, giving a back of about 1,000′. The longer tunnel has cut te ores averaging about 3% copper, with small gold and silver values.

IITE MINES CO. **UTAH.**

ne office: Bingham Canyon, Salt Lake Co., Utah. W. Mont Ferry and Bamberger, directors. Organized circa August, 1909, with capitalization 00, shares $1 par. Is practically controlled by Bingham Mines Co., a large share interest. Lands, 12 claims, including the Yosemite group tented claims, the Cluster group of 5 claims, and the Mississippi claim ng. Property is said to have produced upwards of $1,000,000 in gross es, under previous ownership. It is planned to develop the mine by a tunnel from the Mascot tunnel, giving a back of 1,500′ on the dip of the the beginning of the branch tunnel.

TANI COAL MINE CO. **JAPAN.**

ne office: Satokawa-mura, Nomi-gori, Kaga, Japan. Property is the mine, having power installations of 213 and 1,367 h. p. Ore carries gold nor silver values. Company employs circa 700 hands. Production 1,491 lbs. fine copper in 1906, and 960,052 lbs. fine copper in 1907.

AMERICA MINE. **NEW MEXICO.**

ne office: Magdalena, Socorro Co., N. M. W. Russell, lessee and man-

ager. Property carries auriferous copper ores, and has a small steam plant, employing about 20 men at last accounts.

YUMA COPPER CO. ARIZONA.

Office: Shelden Bldg., Houghton, Mich. Mine office: Vicksburg, Yuma Co., Ariz. Employs circa 25 men. Samuel Brady, president; John L. Harris, vice-president; Courtney C. Douglass, secretary; Wm. B. McLaughlin, treasurer; preceding officers, Prof. A. E. Seaman, Allen F. Rees and Thos. C. Job, directors; Dr. Ernest A. Haggott, consulting engineer; Enoch Henderson, superintendent; W. M. Wilson, mine foreman. Organized March, 1909, under laws of Arizona, with capitalization $2,000,000, shares $10 par; issued, 50,000 full-paid shares and circa 100,000 shares $1 paid, leaving 50,000 shares unissued. The full-paid stock was given in part payment for lands and options and for promotion profits, and the full paid stock is in escrow until September, 1911. Stock is listed on the Boston curb.

Lands, 31 contiguous claims, area circa 600 acres, in the Ellsworth mining district of the Harcúvar Mountains, north of McMillan valley, 9 miles northwest of Vicksburg and 5 miles from Arizona & California railroad, also a millsite and townsite on the railroad line, 6 miles from Vicksburg and 5 miles from the mine. Property includes the Lind-Griffin group of 21 claims, and 10 claims adjoining, formerly held by the Ironwood & Arizona Development Co., which expended about $25,000 on the property, and sold same to the Butte & Arizona Copper Mining Co., which in turn disposed of it to the Yuma Copper Co. Price of lands, in addition to full-paid shares, was $75,000, of which $29,000 has been paid, leaving $46,000 due, in equal installments of $23,000 June, 1910, and March, 1911.

The hills to the west, north and northeast enclose a central amphitheatre, apparently forming an anticlinal fold, the basin lying 1,000′ to 1,700′ higher than the railroad valley, 5 miles below. The property shows 2 main mineralized zones of limestone, ranging from east and west, there apparently being a much greater limestone area capped by andesite. The southerly zone has a strike of about southeast and northwest, with dip to the northwest of apparently about 15°, but same probably will be found about 30° to 50° at depth, the surface dip being deceptive, due to erosion underneath the heavy iron capping. The southerly zone is frequently cut and faulted by cross dykes of andesite, with surface evidences of enrichment, and the footwall of both zones is a siliceous schist. Both zones carry heavy gossans, ranging from 100′ to more than 500′ in width, the gossan of the southerly zone being marked by magnetite and silicified limestone carrying copper carbonates and traces of copper sulphides. The northerly zone, with similar cross dykes of andesite, lies practically east and west, running through 5 claims, with similar but wider gossans. The great extent of crushed limestone and iron cappings renders the surface indications unusually promising, and geological conditions favor extensive ore bodies at depth. Ores as developed by numerous pits and trenches remaining from exploratory workings, from which a little selected high-grade carbonate ore was shipped, show mainly copper carbonates, below commercial tenor, with occasional small masses of rich oxidized ores, all carrying small gold and silver values. Surface ore is mainly malachite, with some azurite, and sulphides in the bottom workings. Ores developed have assayed up to 14% in copper tenor, not including rich selected samples.

Old workings of the Ironwood & Arizona, on which about $25,000 expended to rather poor advantage, included a short tunnel on the Co claim, showing a 6′ vein of leached ore, carrying copper carbonates commercial tenor. The Ironwood & Arizona also sunk the 3-compa Tribune shaft, on a line between the Tribune and Fraction claims, to th ′ only, and indications are that this shaft would have to be sunk

watered. Property carries a contact depo
to about 15' in maximum width. Develo
shaft and a 110' shaft, with about 1,500'
at depth of about 165'. Ore is estimated
and can be brought, by hand selection,
between October, 1908, and May, 1909, t
smelter, Butte, and 1 carload to the Tac
11%, 14.5%, 15% and 32.5% respectively.

The company alleged in its prospectus
1906, which claim was unwarranted, an
general manager, necessitating suspension
greatly retarded. Notwithstanding the s
in confidently predicting dividends for 19
work of making a mine, and is entitled t

CHAPTER XXVI.

General Copper Statistics.

This, the final chapter of the work, devoted to the statistics of the copper try, contains a larger number of tables than in the earlier editions, and two or three times as much matter per page, it having been found possible nsolidate two and even three of the tables of the earlier editions into a single It will be found, in many cases, that a single table gives figures covering -dozen or more different but cognate points.

The exact order of precedence in which these tables are published is varied le, from year to year, as required by mechanical exigencies. The task of ing-up" for the press upwards of forty different tables of statistics, each in what different form from any other, and of greatly varying lengths, so as to r in logical sequence, yet give full pages without awkward breaks or bad ıg, is one that can be appreciated only by an experienced printer, and the ıal degree of success that has been secured in the typographical handling of extremely awkward matter also is to be fully appreciated only by those who wrestled with similar problems. There is, however, a grouping of the tics contained in this chapter, under nine sub-heads, which are given, in edition, in the following invariable order, though there may be occasional positions of individual tables contained in a subdivision:

World's Production: Eight tables covering a variety of features.

American Production: Two tables.

Lake Superior Production: Two tables.

American Imports: One table.

American Exports: Two tables.

World's Copper Trade: Eleven tables covering imports, exports, supplies onsumption, for the world and for all leading consuming countries.

Prices and Values: Six tables.

Copper Share Finances: Eight tables, devoted to dividends, assessments, alization and sales of shares of American copper mining companies.

Twentieth Century Production: One table, giving comparative figures ithmetical progression, based upon the figures of production and consump- of the preceding century.

ll tables are fully entered, both by titles and by numerous cross-references, index at the end of the volume.

WORLD'S COPPER PRODUCTION.

(*Long Tons.*)

Year.	United States.	Foreign.	Total.	Perce of U. Produ
1880	27,000	126,959	153,959	
1881	32,000	131,000	163,000	
1882	40,467	141,155	181,622	
1883	51,574	147,832	199,406	
1884	64,708	155,141	220,249	
1885	74,052	151,540	225,592	
1886	70,430	146,656	217,086	
1887	81,017	142,781	223,798	
1888	101,054	156,972	258,026	
1889	101,239	159,966	261,205	
1890	115,966	153,489	269,455	
1891	126,839	152,552	279,391	
1892	154,018	156,454	310,472	
1893	147,033	156,497	303,530	
1894	158,120	166,385	324,505	
1895	169,917	164,648	334,565	
1896	205,384	167,979	373,363	
1897	220,571	178,384	398,955	
1898	235,050	194,106	429,156	
1899	253,870	215,440	469,310	
1900	269,111	216,743	485,854	
1901	268,522	242,497	511,019	
1902	294,297	247,870	542,167	
1903	311,582	273,499	585,081	
1904	362,739	278,955	641,694	
1905	402,704	293,005	695,709	
1906	409,414	303,200	712,614	
1907	386,655	326,500	713,155	
1908	420,953	328,300	749,253	

COPPER PRODUCTION BY CONTINENTS.

(*Long Tons.*)

Year.	North America.	Europe.	South America.	Asia.	Australasia.	Africa.
1896	222,524	88,948	26,340	21,000	11,272	7,450
1897	242,679	90,829	25,300	23,000	16,583	7,440
1898	261,625	89,461	30,065	25,175	15,943	7,110
1899	282,636	93,383	32,730	27,560	20,894	6,490
1900	303,784	91,009	36,095	28,121	21,270	6,720
1901	320,044	91,161	43,080	27,475	28,633	7,472
1902	355,280	91,552	40,266	29,775	27,281	4,450
1903	384,138	94,056	42,561	31,360	28,116	5,230
1904	445,557	90,820	41,265	34,850	26,657	7,775
1905	489,959	88,215	39,945	35,910	33,940	7,740
1906	497,794	91,995	36,855	42,740	36,250	6,980
1907	471,955	102,000	40,600	49,700	41,900	7,000
1908	489,653	112,100	56,800	43,700	40,100	6,900

WORLD'S COPPER PRODUCTION BY COUNTRIES.

(Based on the figures of Henry R. Merton & Co. Ltd.)

(*Long Tons.*)

	1890	1895	1900	1904	1905	1906	1907	1908
.....	120	35	.....	.....	415	440	100	.....
.....	150	150	775	155	155	105	200	200
.....	7,500	10,000	23,000	34,160	33,940	36,250	41,900	40,100
.....	1,210	1,110	865	1,275	1,175	1,225	900	1,600
.....	1,900	2,250	2,100	2,000	2,000	2,500	2,500	2,500
.....	3,050	4,000	8,500	19,185	20,535	25,460	26,000	29,000
y.....	6,450	7,080	6,720	7,775	7,325	6,540	6,900	6,900
.....	26,120	22,075	25,700	30,110	29,165	25,745	27,100	38,900
in.....	935	580	650	500	715	500	700	700
.....	17,625	16,555	20,410	21,045	22,160	20,340	20,800	20,500
.....	300	200	490	175	150	210	100	100
.....	2,200	2,500	2,955	3,335	2,950	2,865	3,400	3,000
.....	15,000	18,430	27,840	34,850	35,910	42,740	49,700	43,700
.....	4,325	11,620	22,050	50,945	64,440	60,625	57,500	38,200
ind....	1,735	1,800	1,900	2,200	2,280	2,295	1,800	1,500
.....	1,390	2,685	3,935	5,415	6,305	6,120	7,100	9,300
.....	150	450	8,220	6,755	8,625	8,505	10,800	15,200
.....	4,800	5,280	8,000	10,700	8,700	10,490	15,200	20,400
.....	830	515	450	390	550	500	2,000	2,000
rtugal...	51,700	54,950	52,872	47,035	44,810	49,320	50,500	53,400
es.....	115,966	169,917	269,111	362,739	402,704	409,414	386,655	420,953
.....	.....	.....	520	950	700	425	1,300	1,100
.....	5,640	.....	.....	.....	.....	.....	.....	.....
.....	269,096	332 182	486,363	641,694	695,709	712,614	713,155	749 253

WORLD'S PRODUCTION OF REFINED COPPER.

llowing table, based upon figures of the Metallegesellschaft und Metal-esellschaft A.-G., gives estimated figures of production of raw copper ntry, whether from native or imported ores, matte or impure raw copper for refining:

(*Metric Tons.*)

	1895	1900	1903	1904	1905	1906	1907	1908
tes.....	170,100	286,900	327,100	380,900	411,000	429,400	421,400	449,500
in.....	78,246	80,000	71,400	65,300	68,000	72,700	72,400	71,400
.....	7,000	10,000	42,200	48,500	53,300	51,000	52,000	40,000
.....	15,500	24,300	33,200	32,100	33,700	45,000	45,000	36,000
.....	25,777	30,900	31,200	30,300	31,700	32,300	31,900	30,000
.....	12,100	21,800	19,500	22,700	23,900	29,500	32,500	34,500
.....	19,600	20,000	22,000	22,000	21,000	20,000	20,000	20,000
.....	100	500	7,200	8,000	10,700	13,800	14,000	14,000
.....	5,854	8,100	10,500	10,900	8,900	10,600	15,000	16,800
sc....	1,500	2,600	12,200	11,500	11,000	12,000	7,500	11,400
.....	8,245	6,400	6,900	6,900	6,200	7,100	11,000	8,000
, misc..	3,800	4,000	4,000	4,000	4,000	4,000	5,500	2,000
.....	2,375	2,800	3,600	3,600	3,600	3,600	4,000	4,000
ngary..	1,276	1,200	1,400	1,500	1,400	1,500	1,100	1,300
.....	351,473	499,500	592,400	648,200	688,400	732,500	733,300	738,900

ESTIMATE OF WORLD'S P

This table, similar to estimates given
an estimate, based upon the best data at co
per by the world for the year 1909, compar
preceding years. As final figures are not ob
for the year preceding, the difficulties in the
mate of output for the current year, at
The previous estimates, when compared wi
later, proved to be 2.3% too high for 1902;
for 1904; 3.7% too high for 1905, 3.1% too

Country.
Algeria
Argentina
Australasia
Austria
Bolivia
Canada
Cape Colony
Chile
Great Britain
Germany
Hungary
Italy
Japan
Mexico
Newfoundland
Norway
Peru
Russia
Sweden
Spain and Portugal
United States
Turkey
Totals

WORLD'S COPPER PRODUCTION

(*Long T*

Decade.	Average Price of Rough Copper.	World's Production of Each Decade.
1801 to 1810	£160	91,000
1811 to 1820	130	96,000
1821 to 1830	101	135,000
1831 to 1840	94	218,400
1841 to 1850	83	291,000
1851 to 1860	111	506,999
1861 to 1870	87	900,000
1871 to 1880	79	1,189,000
1881 to 1890	60	2,373,398
1891 to 1900	52	3,708,901
Totals and Averages	£96	9,507,299

PRODUCTION OF WORLD'S LARGEST MINES.

(*Pounds Avoirdupois.*)

	Calumet & Hecla.	Anaconda.	Rio Tinto.	Boston & Montana.	Mansfeld.	Copper Queen.
.....	1,315,173	.....	1,937,843	.....	5,865,898	.....
.....	5,098,375	.....	2,475,765	.....	7,442,226	.....
.....	12,315,771	.....	2,147,280	.....	8,084,140	.....
.....	14,031,584	.....	2,231,055	.....	8,384,980	.....
.....	16,222,590	.....	1,895,956	.....	8,718,480	.....
.....	16,162,183	.....	1,772,498	.....	12,070,542	.....
.....	18,848,265	.....	.....	.....	12,281,487	.....
.....	20,125,225	.....	.....	.....	11,372,905	.....
.....	21,473,954	.....	.....	.....	13,312,499	.....
.....	21,690,732	.....	11,731,708	.....	13,852,024	.....
.....	23,568,468	.....	41,057,139	.....	15,230,287	.....
.....	25,253,128	.....	54,245,564	.....	17,645,115	.....
.....	26,270,943	.....	50,228,595	.....	18,882,434	.....
.....	31,675,239	.....	58,775,915	.....	21,734,902	1,379,940
.....	31,360,781	.....	61,171,913	.....	24,377,210	3,866,581
.....	32,053,528	.....	38,951,360	.....	25,795,840	7,744,278
.....	33,125,045	.....	45,857,280	.....	28,310,320	7,823,081
.....	40,473,585	.....	48,203,200	.....	28,182,680	7,966,617
.....	47,247,990	36,000,000	52,664,160	7,500,000	27,888,000	6,993,782
.....	50,518,220	33,267,854	55,328,000	2,000,000	28,212,800	3,797,256
.....	46,016,123	57,000,000	63,840,000	1,500,000	29,176,000	5,707,728
.....	50,295,721	63,245,473	63,840,000	18,278,667	29,070,200	12,031,614
.....	48,668,296	61,647,000	66,080,000	25,425,228	34,723,440	12,152,910
.....	59,868,106	64,946,812	67,200,000	25,942,296	35,392,000	13,120,934
.....	63,586,620	46,500,000	71,680,000	25,000,000	30,920,000	13,022,907
.....	56,495,211	75,000,000	70,560,000	20,286,595	34,406,400	12,916,416
.....	60,427,913	75,256,557	69,664,000	21,800,000	31,696,000	13,795,618
.....	61,324,626	95,578,000	73,920,000	50,000,000	33,677,000	12,968,372
.....	79,137,399	99,775,294	75,040,000	55,000,000	29,286,400	16,235,728
.....	89,280,621	125,850,693	76,920,000	60,250,000	40,913,000	22,966,199
.....	83,248,954	131,471,227	75,936,000	60,000,000	40,220,400	23,009,873
.....	86,426,329	107,214,659	75,499,200	62,000,000	40,420,800	23,747,399
.....	89,519,963	107,914,337	76,988,800	65,000,000	40,558,400	26,901,684
.....	77,240,382	110,000,000	80,539,680	66,200,000	41,352,000	24,382,209
.....	82,519,476	101,899,224	79,179,520	70,000,000	41,997,200	29,781,322
.....	81,248,739	100,000,000	77,286,200	75,000,000	41,000,000	25,831,735
.....	76,490,889	93,300,000	80,216,400	90,750,000	42,500,276	26,385,000
.....	80,241,519	90,000,000	80,216,400	94,000,000	41,929,249	28,905,000
.....	95,190,010	95,000,000	72,307,200	89,000,000	43,824,161	26,570,847
.....	100,123,420	95,997,440	72,000,000	93,401,344	40,000,000	29,696,404
.....	85,863,116	70,000,000	72,300,000	70,000,000	38,822,000	26,915,372

PRODUCTION OF WORI

In this table are given annual produ
really important copper mines of the wo
smaller mines making as much as 100,00
The products in round numbers are estir
available, the other figures being exact

(*Pounds Av*

No.	Mine or Company.	
1	American S. & R. Co.	U. S.
2	Anaconda	Mont
3	Calumet & Hecla	Mich
4	Rio Tinto	Spai
5	Boston & Montana	Mon
6	Copper Queen	Ariz
7	Utah Copper	Utah
8	Butte Coalition	Mon
9	Mansfeld	Gerr
10	United States	Calif
11	North Butte	Mon
12	Arizona	Ariz
13	Nevada Consolidated	Nev
14	United Verde	Ariz
15	Copper Range	Mich
16	Calumet & Arizona	Ariz
17	Mammoth	Calif
18	Boleo	Mexi
19	Chilena de Fundiciones	Chil
20	Granby	Briti
21	Old Dominion	Ariz
22	Osceola	Mich
23	Quincy	Mich
24	Furukawa	Japa
25	Cerro de Pasco	Perú
26	Superior & Pittsburg	Ariz
27	Wallaroo & Moonta	Aust
28	Greene-Cananea	Mexi
29	Original	Mon
30	Champion	Mich
31	Baltic	Mich
32	Mt. Lyell	Tasm
33	Boston Consolidated	Utah
34	Detroit	Ariz
35	Kosaka	Japa
36	Cape	Cape
37	Lota i Coronel	Chile
38	Shannon	Ariz
39	Ashio	Japa
40	Tennessee	Tenn
41	Utah Consolidated	Utah
42	Mitsu Bishi	Japa
43	Tamarack	Mich
44	Mt. Morgan	Aust
45	Sumitomo	Japa
46	Besshi	Japa
47	Bingham	Utah
48	Bogoslovski	Russ
49	Mohawk	Mich
50	Butte & Boston	Mont

UCTION OF WORLD'S LEADING MINES.

(*Pounds Avoirdupois.*)

Company.	Location.	Year.	Output.
.....	Michigan	1908	[illegible]
.....	Spain	1907	[illegible]
a.....	Mexico	1907	[illegible]
ar.....	Australia	1906	[illegible]
.....	Montana	1909	[illegible]
m Expln. Co.....	Mexico	1907	[illegible]
.....	California	1909	[illegible]
M. L. Co.....	Michigan	1908	[illegible]
.....	Norway	1907	[illegible]
.....	Montana	1909	[illegible]
l.....	Chile	1908	[illegible]
.....	California	1909	[illegible]
.....	Mexico	1905	[illegible]
.....	Mexico	1906	[illegible]
e.....	Utah	1907	[illegible]
.....	Arizona	1909	[illegible]
olumbia.....	British Columbia	1908	[illegible]
.....	Cuba	1907	[illegible]
.....	Michigan	1908	[illegible]
n.....	Tennessee	1907	[illegible]
m.....	Idaho	1906	[illegible]
.....	Cape Colony	1905	[illegible]
tain.....	Michigan	1908	[illegible]
.....	German S.W. Africa	1908	[illegible]
gilsk.....	Russia	1908	[illegible]
nd-Ely.....	Nevada	1908	[illegible]
.....	Cape Colony	1906	[illegible]
ini.....	Italy	1905	[illegible]
Barry, Ltd.....	Portugal	1906	[illegible]
.....	Spain	1907	[illegible]
.....	Cape Colony	1905	[illegible]
.....	Newfoundland	1905	[illegible]
Arizona.....	Arizona	1907	[illegible]
.....	Utah	1907	[illegible]
.....	Montana	1909	[illegible]
.....	California	1909	[illegible]
Maaden.....	Turkey	1906	[illegible]
ora.....	Mexico	1903	[illegible]
& Montana.....	Montana	1906	[illegible]
d.....	Australia	1907	[illegible]
oming.....	Wyoming	1908	[illegible]
ntain.....	New Mexico	1907	[illegible]
.....	Chile	1905	[illegible]
.....	Ontario	1905	[illegible]
e.....	Montana	1909	[illegible]
ils.....	Chile	1906	[illegible]
Anexas.....	Mexico	1904	[illegible]
.....	Chile	1907	[illegible]
.....	Russia	1905	[illegible]
Smelting Works..	British Columbia	1906	[illegible]
.....	Michigan	1908	[illegible]
e.....	Chile	1903	[illegible]
.....	Chile	1905	[illegible]
Tenilla.....	Chile	1903	[illegible]
.....	British Columbia	1908	[illegible]
erg.....	Germany	1905	[illegible]
.....	Chile	1909	[illegible]
ni M. & S. Co....	British Columbia	1907	[illegible]
.....	Mexico	1905	[illegible]
ber.....	Japan	1907	[illegible]

PRODUCTION OF WORLD'S LE

(*Pounds Avo*

No.	Mine or Company.	Locat
111	Chillagoe	Austra
112	O. K.	Austra
113	Gibson	Arizo
114	Snowshoe	Britis
115	Democrata	Mexic
116	Allouez	Michi
117	Isle Royale	Michi
118	Britannia	Britis
119	Michigan	Michi
120	Demidoff	Russi
121	Dominion	Britis
122	Maipo	Chile.
123	Empire	Idaho
124	Kedabeg	Russi
125	"Lloyd"	Austra
126	Mungana (Chillagoe)	Austra
127	Mond	Ontari
128	Gatico	Chile.
129	Osaruzawa	Japan
130	Artola Hnos.	Chile.
131	Chañaral	Chile.
132	Le Roi	Britis
133	Rudianski	Russi
134	Santa Rita	New M
135	Tinto y Santa Rosa	Spain
136	Amarilla	Chile.
137	Mt. Molloy	Austra
138	Atacama	Chile.
139	Carrizal	Chile.
140	National Met. Co.	Mexic
141	Tiro General	Mexic
142	Vigsnes	Norwa
143	Salt Lake	Utah.
144	Centennial	Michi
145	Paramatta	Austra
146	Peña	Spain
147	Berthin	Bolivi
148	Alverdski	Russi
149	Akhtala	Russi
150	Hadley	Alask
151	Santa Ines y Morococha	Perú.
152	Toldo	Chile.
153	New England & Clifton	Arizo
154	Ikuno	Japan
155	Hibira	Japan
156	Yoshioka	Japan
157	Mt. Lyell Blocks	Tasm
158	Superior	Michi
159	Hidachi	Japan
160	Mass	Michi
161	Saddle Mountain	Arizo
162	Braden	Chile.
163	Collahuasi	Chile.
164	Ramos	Mexic
165	Spassky	Siberi
166	Fenice Massetana	Italy.
167	Coro Coro	Bolivi
168	Arakawa	Japan
169	Great Fitzroy	Austra
170	Besa y Ca	Chile

PRODUCTION OF WORLD'S LEADING MINES. (Continued.)

(Pounds Avoirdupois.)

Mine or Company.	Location.	Year.	Output.
Arizona Commercial	Arizona	1907	1,638,610
Felix Vicuña	Chile	1903	1,613,262
Carmen	Chile	1903	1,600,000
Hisanichi	Japan	1907	1,588,913
Obie	Japan	1907	1,555,929
Alaska Industrial	Alaska	1907	1,545,941
Atlantic	Michigan	1906	1,539,082
Castillo del Buitron	Spain	1906	1,500,000
Ani	Japan	1907	1,498,646
Nymagee	Australia	1906	1,491,840
Suc. C. J. Lambert	Chile	1903	1,481,491
Pánuco	Mexico	1902	1,466,059
Cochay-Cocha	Perú	1905	1,450,554
Ogoya	Japan	1907	1,426,969
Indian Queen	Montana	1903	1,400,000
Pishminsko-Kluchevski	Russia	1908	1,400,000
Rio Tinto Mexicano	Mexico	1907	1,400,000
San Miguel	Perú	1907	1,400,000
Warrior	Arizona	1907	1,397,612
Hirigane	Japan	1907	1,392,280
Bede	Spain & Norway	1905	1,370,880
Rōros	Norway	1907	1,365,000
War Eagle	British Columbia	1907	1,350,000
Superior & Boston	Arizona	1908	1,350,000
Spruce Mountain	Nevada	1907	1,338,198
T. Marambio	Chile	1903	1,335,326
Stadtberger	Germany	1907	1,322,760
Verch-Kysshtim	Russia	1908	1,300,000
Victoria	Michigan	1908	1,290,040
Las Herrerias	Spain	1907	1,276,800
Capanne Vecchie	Italy	1905	1,261,031
Galizurski	Russia	1905	1,250,000
P. Gonzalez	Chile	1904	1,250,000
Kune	Japan	1907	1,250,000
Kyshtim	Russia	1908	1,250,000
Phillips River	Australia	1907	1,250,000
Torreón	Mexico	1907	1,250,000
Adventure	Michigan	1907	1,244,874
Mt. Andrew	Alaska	1907	1,234,876
Santa Fé	New Mexico	1907	1,223,457
Winona	Michigan	1907	1,207,237
Esperanza	Spain	1907	1,200,000
Orito	Chile	1904	1,200,000
Makimine	Japan	1907	1,185,297
Turgovski	Russia	1902	1,167,500
Mt. Cattlin	Australia	1907	1,147,020
Eclipse-Argo	Montana	1907	1,124,000
Centre Star	British Columbia	1904	1,121,644
Queen Bee	Australia	1907	1,104,320
Piedras Hnos.	Chile	1903	1,080,346
Mitterberg	Austria	1906	1,059,520
Messina (Transvaal)	Transvaal	1907	1,044,219
Beatson's Bonanza	Alaska	1907	1,020,000
De Soto	Arizona	1907	1,016,170
Kusakura	Japan	1907	1,012,043
Anglo-Chilian	Chile	1904	1,000,000
Aguascalientes	Mexico	1907	1,000,000
Cabezas del Pasto	Spain	1905	1,000,000
Crowl Creek-Shuttleton	Australia	1906	1,000,000
Ellamar	Alaska	1907	1,000,000

PRODUCTION OF WORLD'S LE

(*Pounds Av*

No.	Mine or Company.	
231	Maitenes	Chile
232	Sotiel-Coronada	Spain
233	La Viuda	Chile
234	Kano	Japan
235	Yusenji	Japan
236	Sucesion Cerveró	Chile
237	Arizona Expln. Co.	Arizo
238	Glassford Creek	Austr
239	Whim Well	Austr
240	Llaillai	Chile
241	Blinman	Austr
242	Libiola	Italy
243	Niblack	Alask
244	Aljustrel	Portu
245	Bullwhacker	Mont
246	Tacna	Chile
247	Le Roi No. 2	Britis
248	Komaki	Japan
249	Equator	Arizo
250	San Miguel	Spain
251	Juan Muñoz	Chile
252	Grafton	Austr
253	Backus & Johnston	Perú
254	Miculicich y Valentine	Perú
255	Brown-Alaska	Alask
256	San Platon	Spain
257	Saavedra i Besa	Chile
258	East Gwanda	Rhod
259	Twin Buttes	Arizo
260	J. K. Child & Co., Ltd.	Boliv
261	Homanzan	Japan
262	Majestic	Utah
263	Daly West	Utah
264	Furokura	Japan
265	Española de Fundicion	Chile
266	Grafter	Yuko
267	Carlos Riesco	Chile
268	Stora Kopparberg	Swed
269	Yamagatatokito	Japan
270	Altens	Norw
271	Kap-San	Kores
272	Nagamatsu	Japan
273	Geisse Hnos	Chile
274	Copper King	Califo
275	Carreras Hnos	Boliv
276	Tacoma Co	Britis
277	Live Oak	Arizo
278	Shawmut	Color
279	Verchoturski	Russi
280	Innai	Japan
281	Yenisei	Siberi
282	Cordova	Arizo
283	Levant	Engla
284	Killingdal	Norw
285	Caucasus	Russi
286	Omori	Japan
287	Omodani	Japan
288	Bufa	Mexic
289	Edmundian	Port
	Kargalinski	Russ

DUCTION OF WORLD'S LEADING MINES. (Continued.)

(*Pounds Avoirdupois.*)

or Company.	Location.	Year.	Output.
atte	Austria	1905	500,000
l	Mexico	1907	500,000
wns	Australia	1907	500,000
Perez	Chile	1905	500,000
ysterski	Russia	1908	500,000
Alexandrovski	Siberia	1904	500,000
	Australia	1905	500,000
	Oregon	1906	499,662
l	Arizona	1907	497,286
llo	Chile	1903	496,035
a	Japan	1907	490,047
e	Australia	1906	485,280
	Mexico	1905	450,000
s	Chile	1903	450,000
	Perú	1907	444,116
l	Vermont	1907	425,367
	Austria	1907	425,000
	Japan	1904	425,000
ker	Idaho	1907	425,000
ru	Japan	1907	423,371
e	Arizona	1907	421,487
	Australia	1903	400,000
nces	Chile	1903	400,000
	Japan	1907	394,490
Eastern	Utah	1907	391,779
s	Peru	1907	370,372
	Arizona	1907	361,257
Copper Mg. Co	Washington	1908	360,000
	Japan	1907	354,855
	Quebec	1908	350,000
ore	Australia	1907	337,276
an	Australia	1904	337,075
	Japan	1907	330,262
	Japan	1907	327,266
hesney	Australia	1904	325,000
rnecker	Chile	1904	325,000
tor	Australia	1907	325,000
erg	Sweden	1905	325,000
	Montana	1906	320,000
Douglas	Nevada	1907	319,748
	Arizona	1907	319,591
	British Columbia	1904	318,124
rnecker	Chile	1903	310,848
ni	Japan	1907	308,358
la	Australia	1906	300,000
a	Italy	1905	300,000
Ca	Chile	1903	300,000
a	Mexico	1907	300,000
	British Columbia	1907	300,000
	Arizona	1906	298,800
one	Australia	1906	293,440
ay	British Columbia	1906	293,269
	Japan	1906	293,045
za	Mexico	1905	275,000
Ribillo	Chile	1903	275,000
	Michigan	1905	
a	Japan	1907	
	Japan	1907	
Espinoza	Cl	1903	
n-Mexico	M	1904	

PRODUCTION OF WORLD'S LE

(Probable Am

No.	Mine or Company.	L
351	Francisco Greve G.	Chili.
352	Inaya	Japan
353	Sundsera	Austr
354	Burra Burra	Austr
355	Carisa	Utah.
356	Cherwelah Copper King	Wash
357	Darwana	Chile.
358	Lynda	Austr
359	Stamford	Califo
360	Rambler	Wyon
361	Arizona United	Arizo
362	Hiratani	Japan
363	Burnie	Tasm
364	Vilhil i Vidella	Chile.
365	Takura	Japan
366	Chuevara	Peru.
367	Sawatari	Japan
368	Ain-Sarbar	Algeri
369	Wisemer	Germ
370	Bonanza Belt	Arizo
371	Daiji	Japan
372	Mendoza y Co.	Mexic
373	A. Varmani	Peru.
374	Morrowy S. & R. Co.	Mexic
375	Keystone	Arizo
376	New Anniversary	Austr
377	Natividad	Peru.
378	Cuchares	Mexic
379	Copper Belle	Arizo
380	Francisco Vaggara I	Chile.
381	Weimer	Idaho
382	Kokusai	Japan
383	Ota	Japan
384	Ito	Japan
385	Tsubaki	Japan
386	Baltonia	Arizo
387	Cadwalla	Mexic
388	Bay Central	Arizo
389	Cadillac	Arizo
390	Silver Spur	Austr
391	J. M. Salamanca	Chile.
392	Rochelle	Germ
393	Bessie	Russ
394	Washoe	Japan
395	Oregon S. & R. Co.	Orego
396	Round Hill	Arizo
397	Nakahama	Japan
398	Carolina y Co.	Chile.
399	Hanshan	Bolivi
400	Rialto	Austr
401	Rosario Providencia	Chile.
402	Santa Cecilia	Mexic
403	Ajax	Utah.
404	Gold Creek	Austr
405	Irishbank	Austr
406	Nakamaya	Japan
407	Rockinghorse	Natal.
408	Yoshin	Japan
409	Tango Lucia	Arizo
410	Silverado	Nevad
411	Tokugawa	Japan

ODUCTION OF WORLD'S LEADING MINES. (Continued.)

(*Pounds Avoirdupois.*)

e or Company.	Location.	Year.	Output.
ander	Australia	1907	142,260
ott	Australia	1906	140,000
ver	British Columbia	1907	140,000
nindah	Australia	1906	139,776
oaño	Perú	1907	139,551
n Territories	Australia	1904	136,640
Hill	Utah	1904	134,000	
	Japan	1907	132,412
cial Mg. Co.	Arizona	1907	125,598
Ikeda	British Columbia	1907	125,000
Mena	Chile	1903	125,000
merican	Missouri	1907	125,000
s	Spain	1907	125,000
	Spain	1907	125,000
River	Australia	1906	124,440
rraguibel	Chile	1903	123,857
aw	Michigan	1908	122,474
d	Alaska	1907	120,000
	Japan	1906	119,044
itch y Linguardo	Perú	1904	118,956
ia	Perú	1907	115,000
ri	Japan	1907	114,411
	Australia	1906	114,398
ue	Australia	1906	112,000
zuka	Japan	1907	111,120
ley	Arizona	1907	110,000
ueen	Arizona	1907	108,027
	Chile	1907	104,000
chi	Japan	1907	101,301
-Butte	Montana	1907	101,000
wa	Japan	1906	101,000
hite Bear	British Columbia	1907	101,000
ndra	Australia	1907	101,000
Butte	Arizona	1907	101,000
	British Columbia	1907	101,000
	Australia	1907	101,000
neiss Geisse	Chile	1907	101,000
straliin	Australia	1907	101,000
a	Japan	1907	101,000
lle y Huan	Perú	1907	101,000
Paria	Wales	1906	101,000
	Montana	1907	101,000
	Brazil	1907	101,000
	Japan	1907	101,000
	Tokio	1907	101,000

AMERICAN COPPER

(*Long T*

Year.	United States Total Production	Michigan Production	Per of t
1850	650	572	8
1851	900	779	8
1852	1,100	792	7
1853	2,000	1,297	6
1854	2,250	1,819	8
1855	3,000	2,593	8
1856	4,000	3,666	9
1857	4,800	4,255	8
1858	5,500	4,088	7
1859	6,300	3,985	6
1860	7,200	5,388	7
1861	7,500	6,713	8
1862	9,000	6,065	6
1863	8,500	5,797	6
1864	8,000	5,576	6
1865	8,500	6,410	7
1866	8,900	6,138	6
1867	10,000	7,824	7
1868	11,600	9,346	8
1869	12,500	11,886	9
1870	12,600	10,992	8
1871	13,000	11,942	9
1872	12,500	10,961	8
1873	15,500	13,433	8
1874	17,500	15,327	8
1875	18,000	16,089	8
1876	19,000	17,085	8
1877	21,000	17,422	8
1878	21,500	17,719	8
1879	23,000	19,129	8
1880	27,000	22,204	8
1881	32,000	74,363	7
1882	40,467	25,439	6
1883	51,574	26,653	5
1884	64,708	30,961	4
1885	74,052	32,209	4
1886	70,430	36,124	5
1887	81,017	33,941	4
1888	101,054	38,604	3
1889	101,239	39,364	3
1890	115,966	45,273	3
1891	126,839	50,992	4
1892	154,018	54,999	3
1893	147,033	50,270	3
1894	158,120	51,031	3
1895	169,917	57,737	3
1896	205,384	63,418	3
1897	220,571	63,706	2
1898	235,050	66,056	2
1899	253,870	65,603	2
1900	269,111	63,461	2
1901	268,522	69,501	2
1902	294,297	76,050	2
1903	311,582	85,848	2
1904	362,739	93.001	2
1905	402,704	102,874	2
1906	409,414	102,514	2
1907	386,655	96,480	2
1908	420,953	99,408	2

UNITED STATES COPPER PRODUCTION BY STATES.

(Based on figures of United States Geological Survey.)

(*Pounds Avoirdupois.*)

ıte.	1904.	1905.	1906.	1907.	1908.
.....	2,043,586	4,900,866	8,685,646	7,034,763	4,438,836
.....	191,602,958	235,908,150	262,506,103	256,778,437	289,523,267
a	28,529,023	16,697,489	28,153,202	33,696,602	39,643,835
.....	9,506,944	9,404,830	7,427,253	13,998,496	13,943,878
.....	2,158,858	7,321,585	8,578,046	9,216,299	7,256,086
.....	208,355,935	230,437,992	229,632,608	216,116,747	222,647,918
.....	298,314,804	314,750,582	294,701,252	224,263,789	252,503,651
.....	.....	413,292	1,090,635	1,998,789	12,241,372
xico	5,368,666	5,334,192	7,099,842	10,140,140	4,991,351
arolina .	.....	.....	582,209	544,040	29,391
.....	.....	.....	545,859	518,694	271,191
akota ..	100,000	38	.....	.....	5,471
e.....	.....	.....	17,809,442	19,745,119	19,710,103
.....	47,062,880	58,153,393	50,329,119	66,418,370	71,370,370
.....	.....	.....	240,315	696,102	.....
ton	363,694	223,328	290,823	122,263	162,201
g.....	5,565,629	2,530,531	106,177	3,026,004	2,416,197
South...	1,211,086	15,134,960	149,102	147,663	173,490
neous...	120,118	846,615	647,583	1,356,051	1,580,831
tals....	812,563,954	902,057,843	918,635,216	865,818,368	942,936,449
ported ores					
attes..	38,947,772	50,105,300	191,370,022	163,519,756	218,705,487
Totals .	851,511,726	952,163,143	1,110,005,238	1,029,338,124	1,161,641,936

LAKE SUPERIOR COPPER PRODUCTION BY MINES.

(*Pounds Avoirdupois.*)

	1904.	1905.	1906.	1907.	1908
re.....	1,380,480	1,606,208	1,552,628	1,244,874	90,870
.....	376,687	1,552,957	3,077,507	5,510,985	6,280,241
.....	.....	1,167,957	3,486,900	2,934,116	3,047,051
.....	5,321,859	4,049,731	1,439,082	.....	.....
.....	12,177,729	14,384,684	14,397,557	16,704,868	17,724,854
& Hecla..	80,341,019	95,100,610	100,023,420	83,863,116	81,660,723
ial.....	641,294	1,446,584	2,253,015	2,373,572	2,196,377
n.....	12,212,954	15,707,426	16,954,986	16,489,436	17,786,763
.....	4,771,050	4,206,085	4,571,570	4,401,248	3,703,421
ale.....	2,442,905	2,973,761	2,937,098	2,667,608	3,011,664
aw	.....	.....	.....	.....	122,474
.....	2,182,931	2,007,950	2,106,739	2,078,677	1,766,930
t.....	2,746,127	2,891,796	2,875,341	2,665,404	3,000,206
.....	8,149,515	9,387,614	9,352,252	10,107,266	10,295,881
.....	20,472,429	18,938,965	18,588,451	14,134,753	21,250,794
.....	1,162,201	273,219	.....	.....	.....
.....	18,343,160	18,827,557	16,194,838	19,796,058	20,600,361
k.....	14,961,885	15,824,008	9,832,644	11,078,604	12,806,127
h.....	.....	.....	58,008	* 60,000	.....
tain.....	10,211,230	10,476,462	9,507,933	8,190,711	6,034,908
.....	.....	.....	546,334	1,207,237	1,290,040
.....	646,025	.....	278,182	1,285,863	.....
ne.....	9,764,455	9,464,418	9,548,123	9,272,351	9,955,233
neous.....	* 50,000	* 150,000	* 50,000	* 50,000	*50,000
als.....	208,355,935	230,437,992	229,632,608	216,116,747	222,674,918

*Estimated.

PRODUCTION, VALUE AND DI

Year.	Gross product fine copper (Pounds).	Gross value of production (Dollars).
1845	24,880	5,000
1846	58,240	10,000
1847	297,120	55,000
1848	1,032,640	200,900
1849	1,505,280	336,000
1850	1,281,280	286,000
1851	1,744,960	289,500
1852	1,774,080	396,000
1853	2,905,280	648,500
1854	4,074,560	909,500
1855	5,809,334	1,586,160
1856	8,217,392	2,218,320
1857	9,530,830	2,382,500
1858	9,159,916	2,129,235
1859	8,937,995	1,950,355
1860	12,068,375	2,654,960
1861	15,182,837	3,487,995
1862	13,586,318	3,634,255
1863	12,985,444	4,415,600
1864	12,491,965	5,870,300
1865	14,358,592	5,635,515
1866	13,750,063	4,629,375
1867	17,515,607	4,442,841
1868	20,934,124	4,940,424
1869	26,625,301	6,230,016
1870	24,622,759	5,096,752
1871	25,746,448	5,728,485
1872	24,553,523	7,979,400
1873	30,291,505	8,726,100
1874	34,334,389	8,009,356
1875	36,039,497	8,180,625
1876	38,270,997	7,998,430
1877	39,026,671	7,327,880
1878	41,687,266	6,920,540
1879	42,671,529	7,327,350
1880	49,718,337	9,947,673
1881	54,548,909	9,971,702
1882	57,155,980	10,522,416
1883	59,702,404	9,457,853
1884	69,353,202	9,494,306
1885	72,147,889	7,942,597
1886	80,918,460	8,788,476
1887	76,028,697	8,530,342
1888	86,472,034	14,510,001
1889	88,175,675	11,894,942
1890	101,410,277	15,819,960
1891	114,222,709	14,574,727
1892	123,198,460	12,431,624
1893	112,605,078	12,105,145
1894	114,308,870	10,852,122
1895	129,330,749	13,877,109
1896	142,057,500	15,758,935
1897	142,702,586	16,530,843

DUCTION, VALUE AND DIVIDENDS OF LAKE COPPER. (Continued.)

Gross product fine copper (Pounds).	Gross value of production (Dollars).	Total dividends paid (Dollars).	Percentage of dividends to gross value.	Dividends per pound of copper (Cents).
....147,965,738	17,928,473	6,457,250	36.4	4.36
....146,950,338	26,099,302	12,334,430	47.2	8.39
....142,151,571	23,993,928	9,921,200	41.3	6.90
....155,716,848	26,034,457	7,496,500	28.8	4.81
....170,325,506	20,711,393	2,440,000	11.8	1.43
....192,299,191	26,363,449	4,940,000	18.8	2.57
....208,355,905	27,307,307	5,432,500	20.0	2.61
....230,437,902	36,516,946	9,226,000	25.2	4.02
....229,632,606	43,964,722	12,917,500	29.9	6.07
....216,136,747	43,719,949	11,409,550	27.1	5.28
....222,674,918	31,539,257	4,457,500	14.9	2.37
..4,669,099,702	$366,520,746	$109,340,370	25.4	2.92

he average price received for all Lake Superior copper, from 1845 to 1907, ve, was 13.46 cents per pound, with average dividends of 3.7 cents per pound. g an estimated cost of 10.26 cents for all years. While this may be accepted arbitrary figure, the cost might be figured much higher, or materially higher. dding $60,000,000 to the cost of production, for money lost in unproductive es, the cost of copper produced would be made about exactly 11.5 cents per . By adding another $15,000,000 for assessments on mines that have given in dividends the original assessments, cost of copper would be increased to 11.85 cents per pound, leaving a net margin of profit, for the entire production, ost exactly 2 cents per pound, plus the present aggregate values of the mines, would be about equal to total dividend disbursements to date, or about 3.7 per pound.

mitting the production of mines that have not proven profitable, the average f copper produced by dividend-paying Lake Superior mines probably has been 9.5 cents per pound, for all years.

AMERICAN COPPER IMPORTS.

he following table, showing imports of copper, in various forms, into the United s, is summarized from the official figures of the United States government. overnment statisticians have seen fit to vary the methods employed in presenting these figures, from time to time, but the present plan of giving contents in fine r of imported ore and matte is preferable to the old plan of giving actual t of imported ore and matte:

(Pounds Avoirdupois.)

Copper Contents Ore & Matte.	Blue Copper.	Old Copper.	Total Fine Copper.
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]
.....	[illegible]	[illegible]	[illegible]

AMERICAN CO

The United States government esti
got and various forms of refined cop
manufactured products, are as follows:

(*Pounds*

Year Ending—	Ore and Ma
June 30, 1864	10,958,1
1865	22,519,7
1866	21,508,0
1867	8,773,1
1868	9,261,2
1869	12,141,8
1870	1,919,8
1871	5,444,5
1872	3,556,4
1873	4,525,2
1874	1,332,6
1875	5,130,5
1876	1,530,4
1877	2,143,2
1878	3,294,7
1879	2,307,0
1880	2,162,3
1881	995,8
1882	2,593,6
1883	11,292,3
1884	38,614,0
1885	43,230,0
Dec. 31, 1886	41,752,0
1887	50,128,0
1888	79,496,0
1889	81,850,0
1890	43,141,1
1891	67,212,0
1892	94,304,0
1893	83,504,0
1894	8,704,0
1895	27,648,0
1896	41,426,5
1897	18,128,0
1898	18,686,0
1899	7,454,0
1900	20,014,0
1901	24,602,5
1902	40,398,4
1903	27,531,8
1904	42,396,4
1905	84,421,3
1906	106,666,5
1907	222,075,8
1908	141,453,7

AMERICAN COPPER EXPORTS BY DESTINATIONS.

(Pounds Avoirdupois.)

tination.	1900.	1905.	1907.	1908.
nd	101,398,394	130,675,396	156,502,270	195,562,619
any	67,348,848	104,575,864	107,575,864	127,453,392
e	67,725,989	74,904,644	93,075,145	115,090,381
Britain	63,522,445	60,945,794	81,909,441	117,810,314
	5,550,285	15,800,967	21,192,908	25,512,267
a	5,650,423	18,418,982	4,241,386	4,657,077
um	12,554,191	4,997,206	3,822,551	5,560,366
		79,940,250	10,003,592	13,735,809
h North America	1,616,778	3,019,450	3,747,410	3,977,142
co	296,684	290,763	362,411	35,895
llaneous Europe	11,258,115	25,279,162	26,221,024	39,433,674
llaneous	1,051,599	16,350,751	493,873	2,447,101
tals	337,973,751	534,907,619	508,929,401	661,876,127

AMERICAN COPPER EXPORTS BY PORTS.

(Pounds Avoirdupois.)

rts.	1900.	1903.	1904.	1905.
York	230,178,643	211,879,055	360,644,287	332,569,733
more	86 264,231	88,296,071	171,386,493	160,006,001
t Sound	.....	3,666	62,789	28,352,769
port News	2,016,000	1,969,177	7,626,951	6,002,955
delphia	12,468,680	3,845,207	9,718,814	2,486,003
Orleans	3,937,350	3,014	121,835	1,208,926
oit	469,819	611,327	1,187,706	1,032,541
Huron	149,525	261,820	532,841	597,712
on	1,496,387	512,053	838,321	383,811
ington, Vt	678,589	491,921	700,561	264,377
olk	.....	1,771,993	560,536	.....
ellaneous	314,527	1,087,786	1,231,685	2,002,791
tals	337,973,751	310,729,524	554,550,030	534,907,619

AMERICAN COPPER SUPPLY.

(Pounds Avoirdupois.)

	Domestic Production.	Imports.	Total Supply.	Exports.	Net Supply.
	344,998,679	8,066,647	353,065,326	96,515,736	256,549,590
	329,354,398	11,045,297	340,399,695	188,984,128	151,415,567
	354,188,374	11,445,441	365,633,815	168,143,000	197,490,815
	380,613,404	14,616,223	395,229,627	136,528,390	258,701,237
	460,061,430	17,297,272	477,358,702	282,105,860	195,252,842
	494,078,274	28,578,420	522,656,694	288,662,340	233,994,354
	526,512,987	73,916,467	600,429,454	321,023,873	279,405,581
	568,666,921	95,722,340	664,389,261	252,876,480	411,512,781
	606,117,166	105,176,808	711,293,974	348,402,853	362,891,121
	602,072,519	137,826,406	739,898,925	222,137,911	517,761,014
	659,225,014	194,501,757	853,726,771	354,668,849	499,057,922
	729,943,131	168,707,995	898,651,126	310,729,524	587,921,602
	812,537,267	181,292,205	993,829,472	554,550,030	439,279,442
	902,057,843	210,724,685	1,112,782,528	534,907,619	577,874,909
	917,086,889	225,843,281	1,142,930,170	454,752,018	688,178,152
	865,818,368	238,031,320	1,103,849,688	508,924,401	594,925,287
	942,936,449	218,705,487	1,161,641,936	661,876,127	499,765,809

AMERICAN CO

1897-

This table, compiled from the figur
lurgische Gesellschaft A.-G., of Frankfor
dreds of tons:

(*Metri*

Year.	Production.	Im
1897	224,100	1
1898	238,900	3
1899	258,000	4
1900	275,000	4
1901	273,000	8
1902	299,200	7
1903	316,600	7
1904	368,600	8
1905	395,300	9
1906	415,000	10
1907	405,900	11
1908	431,900	9

BRITISH AND FRENCH

This table, based on the compilations
of London, gives estimates of the stocks
and France on the first day of each year n
last column includes also shipments aflo
ports:

(*Long*

Year.	Public Stocks.
1888	35,001
1889	96,198
1890	94,942
1891	62,449
1892	53,486
1893	51,556
1894	43,428
1895	51,575
1896	43,604
1897	31,776
1898	27,895
1899	22,346
1900	17,517
1901	24,435
1902	15,701
1903	11,215
1904	5,601
1905	10,009
1906	5,683
1907	9,324
1908	13,060
1909	46,227
1910	101,972

ENGLISH COPPER TRADE.

(*Long Tons.*)

Production.	Imports.	Gross Supply.	Exports.	Net Supply.	Consumption
3,992	92,734	96,206	59,482	36,914	.....
3,875	86,227	90,102	61,689	28,413	.....
3,464	93,875	97,339	55,983	41,656	.....
2,630	99,146	101,766	59,350	42,416	.....
3,350	109,390	112,740	64,691	48,049	.....
2,733	123,549	126,282	62,080	64,202	.....
1,471	108,015	109,486	60,511	48,975	.....
389	103,089	103,478	69,453	34,025	.....
1,436	135,470	136,926	72,066	64,860	3,667
905	139,963	140,868	75,627	65,261	66,513
935	141,249	142,184	89,747	52,437	84,930
900	138,616	139,515	76,956	63,459	72,422
495	134,371	134,866	82,542	52,324	54,254
425	129,832	130,257	70,986	59,271	67,399
445	125,008	125,453	54,689	70,764	62,617
580	119,941	120,521	65,990	54,531	62,502
580	135,856	136,436	59,334	57,102	61,370
518	136,555	137,073	56,542	80,531	86,245
640	139,704	140,344	63,256	77,088	81,312
637	141,610	142,247	75,271	66,976	61,042
765	154,941	155,706	56,997	98,709	105,586
532	149,578	150,110	70,396	79,714	83,935
482	160,201	160,683	69,156	91,527	97,639
536	132,926	133,462	76,305	57,157	54,050
493	157,897	158,390	73,447	84,943	88,039
700	155,200	155,900	77,800	78,100	74,578
700	145,400	146,100	66,300	79,800	76,159
700	153,100	153,800	42,800	111,000	88,300
700	193,000	193,700	34,400	159,300	128,900

FRENCH COPPER TRADE.

owing table is based upon the compilations of the Metallegesellschaft gische Gesellschaft A.-G.:

(*Metric Tons.*)

Production.	Imports.	Gross Supply.	Exports.	Net Supply.	Consumption
6,400	24,154	30,554	2,116	28,438	25,580
6,600	26,060	32,660	2,204	30,456	28,596
6,400	26,756	33,156	2,467	30,689	28,854
8,245	32,656	40,901	3,163	37,738	32,388
6,544	40,136	46,680	3,456	43,224	35,099
7,400	48,028	55,428	3,559	51,868	43,100
7,800	45,575	53,375	4,044	49,331	39,700
6,600	49,515	56,115	6,882	49,233	42,600
6,400	51,962	58,362	5,736	52,626	46,500
7,000	41,196	48,196	5,122	43,074	34,300
7,300	49,094	56,394	3,485	52,909	43,900
6,900	46,834	53,734	4,658	49,076	42,700
6,900	56,526	63,426	5,369	58,057	45,300
6,200	56,500	62,700	6,600	56,100	50,200
7,100	64,700	71,800	6,100	65,700	58,100
7,500	62,800	70,30	4,900	65,400	65,000
8,000	74,400	82,400	5,200	77,200	73,900

GERMAN CO

The following table is based upon t
und Metallurgische Gesellschaft A.-G.:

(*Metri*

Year.	Production.
1884	18,113
1885	19,928
1886	19,314
1887	20,192
1888	21,017
1889	24,160
1890	24,427
1891	24,092
1892	24,781
1893	24,011
1894	25,722
1895	25,77
1896	29,31
1897	29,40
1898	30,69
1899	34,63
1900	30,92
1901	31,3
1902	30,5
1903	31,2
1904	30,2
1905	31,
1906	32,
1907	31
1908	30

AUSTRO-

The following table is based
lurgische Gesellschaft A.-G.:

Year.	
1892	
1893	
1894	
1895	
1896	
1897	
1898	
1899	
1900	
1901	
1902	
1903	
1904	
1905	
1906	
1907	
1908	

RUSSIAN COPPER TRADE

able is based upon the compilations of the Metallgesellschaft and Metallgesellschaft A.-G.:

(*Metric Tons.*)

	Production.	Imports.	Gross Supply.	Exports.	Net Supply.	Consumption.
.....	4,875	1,505	1,341		1,346	11,500
.....	7,140	8,756	15,856		15,856	15,750
.....	7,440	4,606	12,075		12,075	12,250
.....	7,854	8,100	15,954		15,954	14,000
.....	7,850	10,455	18,305		18,295	18,000
.....	8,000	10,500	18,500		18,445	18,300
.....	7,250	14,550	21,800		21,741	22,000
.....	7,855	10,800	18,655		18,655	18,800
.....	8,140	12,300	20,440		20,440	20,800
.....	8,140	11,440	19,580		19,080	19,000
.....	8,800	17,500	26,300		26,300	26,250
.....	17,500	24,450	41,950		24,950	25,000
.....	10,000	21,300	31,300		31,300	31,250
.....	8,000	19,700	27,800		27,800	27,800
.....	10,500	16,000	26,500	400	26,250	26,000
.....	15,000	4,500	19,500	1,500	18,000	18,000
.....	16,800	4,800	21,600	20	21,580	21,000

ITALIAN COPPER TRADE.

able is based upon the compilations of the Metallgesellschaft and the Gesellschaft A.-G.:

(*Metric Tons.*)

	Production.	Imports.	Gross Supply.	Exports.	Net Supply.	Consumption.
.....	2,564	2,139	4,703	168	4,535	4,800
.....	2,371	3,043	5,414	157	5,257	5,250
.....	2,670	3,706	6,376	32	6,344	6,250
.....	2,375	4,350	6,725	84	6,641	6,750
.....	2,842	4,509	7,351	383	6,968	7,000
.....	2,980	5,032	8,012	222	7,790	7,750
.....	3,230	5,028	8,258	462	7,796	8,000
.....	3,032	5,006	8,038	1,355	6,683	6,500
.....	2,797	6,224	9,021	676	8,345	6,250
.....	3,483	5,982	9,465	100	9,365	9,000
.....	3,863	7,050	10,913	195	10,718	10,000
.....	3,620	6,096	9,716	162	9,554	9,750
.....	3,593	11,492	15,085	180	14,905	15,000
.....	3,578	13,795	17,373	170	17,203	17,250
.....	3,600	15,350	18,950	450	18,500	18,250
.....	4,000	21,000	25,000	300	24,700	25,000
.....	4,000	19,623	23,623	172	23,451	23,000

GERMAN COPPER TRADE.

The following table is based upon the compilations of the Metallegesell und Metallurgische Gesellschaft A.-G.:

(*Metric Tons.*)

Year.	Production.	Imports.	Gross Supply.	Exports.	Net Supply.	G sum
1884	18,113	13,819	31,932	6,906	25,026	2
1885	19,928	13,168	33,096	5,706	27,390	2
1886	19,314	11,913	31,227	6,510	24,717	2
1887	20,192	12,427	32,619	5,154	27,465	2
1888	21,017	8,082	29,099	4,530	24,569	1
1889	24,160	29,643	53,803	7,135	46,668	4
1890	24,427	31,408	55,835	8,428	47,407	4
1891	24,092	34,182	58,274	6,247	52,027	4
1892	24,781	32,498	57,279	6,598	50,681	4
1893	24,011	38,455	62,466	7,517	54,949	5
1894	25,722	37,032	62,754	6,609	56,145	5
1895	25,777	44,365	70,142	6,329	63,813	6
1896	29,319	56,814	86,133	5,996	80,137	7
1897	29,408	67,573	96,981	7,183	89,798	8
1898	30,695	73,291	103,986	6,972	97,014	9
1899	34,634	70,091	104,725	7,061	97,664	9
1900	30,929	83,503	114,432	5,505	108,927	10
1901	31,317	58,620	89,937	5,097	84,840	8
1902	30,578	76,050	106,628	4,678	101,950	9
1903	31,214	83,261	114,475	4,333	110,142	1
1904	30,264	110,231	140,495	4,223	136,272	1
1905	31,717	102,218	133,935	5,958	127,977	1
1906	32,275	126,066	158,341	7,243	151,098	1
1907	31,854	124,072	155,926	6,112	149,814	1
1908	30,001	157,434	187,435	6,778	180,657	1

AUSTRO-HUNGARIAN COPPER TRADE.

The following table is based on the figures of the Metallegesellschaft und lurgische Gesellschaft A.-G.:

(*Metric Tons.*)

Year.	Production.	Imports.	Gross Supply.	Exports.	Net Supply.
1892	1,295	8,644	9,939	342	9,597
1893	1,396	11,822	13,218	434	12,784
1894	1,726	13,383	15,109	255	14,854
1895	1,276	11,747	13,023	151	12,872
1896	1,366	13,666	15,032	228	14,804
1897	1,426	15,926	17,352	159	17,193
1898	1,343	17,442	18,785	173	18,612
1899	1,479	16,185	17,664	534	17,130
1900	1,200	18,970	20,170	471	19,699
1901	1,150	17,504	18,654	435	18,219
1902	1,350	18,256	19,606	436	19,170
1903	1,400	18,704	20,104	1,226	18,878
1904	1,463	22,532	23,995	747	23,248
1905	1,439	22,535	23,974	1,253	22,721
1906	1,457	24,488	25,945	1,271	24,674
1907	1,066	26,181	27,247	619	26,628
1908	1,338	33,259	34,597	1,125	33,472

RUSSIAN COPPER TRADE.

le is based upon the compilations of the Metallegesellschaft und Metal-ellschaft A.-G.:

(*Metric Tons.*)

	Pro-duction.	Imports.	Gross Supply.	Exports.	Net Supply.	Con-sumption
.....	4,978	6,568	11,546	.....	11,546	11,500
.....	5,100	8,756	13,856	.....	13,856	13,750
.....	5,409	6,666	12,075	.....	12,075	12,250
.....	5,854	8,100	13,954	.....	13,954	14,000
.....	5,832	12,433	18,265	.....	18,265	18,000
.....	6,941	12,507	19,448	.....	19,448	19,500
.....	7,291	14,450	21,741	.....	21,741	22,000
.....	7,533	11,100	18,633	.....	18,633	18,500
.....	8,100	12,300	20,400	.....	20,400	20,500
.....	8,100	10,900	19,000	.....	19,000	19,000
.....	8,800	17,500	26,300	.....	26,300	26,250
.....	10,500	14,450	24,950	.....	24,950	25,000
.....	10,900	20,300	31,200	.....	31,200	31,250
.....	8,900	18,700	27,600	.....	27,600	27,500
.....	10,600	16,000	26,600	400	26,200	26,000
.....	15,000	4,500	19,500	1,500	18,000	18,000
.....	16,800	4,800	21,600	20	21,580	21,000

ITALIAN COPPER TRADE.

le is based upon the compilations of the Metallegesellschaft und e Gesellschaft A.-G.:

(*Metric Tons.*)

	Pro-duction.	Imports.	Gross Supply.	Exports.	Net Supply.	Con-sumption.
.....	2,564	2,139	4,703	168	4,535	4,500
.....	2,371	3,043	5,414	157	5,257	5,250
.....	2,670	3,706	6,376	32	6,344	6,250
.....	2,375	4,350	6,725	84	6,641	6,750
.....	2,842	4,509	7,351	383	6,968	7,000
.....	2,980	5,032	8,012	222	7,790	7,750
.....	3,230	5,028	8,258	462	7,796	8,000
.....	3,032	5,006	8,038	1,355	6,683	6,500
.....	2,797	6,224	9,021	676	8,345	6,250
.....	3,483	5,982	9,465	100	9,365	9,500
.....	3,863	7,050	10,913	165	10,748	10,500
.....	3,620	6,096	9,716	162	9,554	9,750
.....	3,593	11,492	15,085	180	14,905	15,000
.....	3,578	13,795	17,373	170	17,203	17,250
.....	3,600	15,350	18,950	450	18,500	18,250
.....	4,000	21,000	25,000	300	24,700	25,000
.....	4,000	19,623	23,623	172	23,451	23,000

AVERAGE [illegible]

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MONTHLY PRICES OF LAKE S

(*Januar*

Year.	January.		February.		
	Highest.	Lowest.	Highest.	Lowest.	
1860	24	23½	24	23¾	2
1861	20	19	19½	19	1
1862	28	27	28	25	2
1863	35	31	37	35	3
1864	41¼	39	42	41¼	4
1865	50½	46	46	44	4
1866	42	38	38	35½	3
1867	29¼	27	27¾	27½	2
1868	23½	21½	24	22½	2
1869	26¼	23¾	27	26	2
1870	22	21⅝	21¼	20⅞	2
1871	22⅞	22	22⅜	21⅞	2
1872	28½	27½	28⅜	28¼	3
1873	35	32½	35	34	3
1874	25	24½	25	24½	2
1875	23½	21½	22¾	21¾	2
1876	23½	23	22⅞	22½	2
1877	19¼	19	20⅛	19½	1
1878	17⅜	17¼	17½	17½	1
1879	16	15½	15½	15½	1
1880	25	21⅜	24½	24	2
1881	19⅜	19⅜	19⅜	19⅛	1
1882	20⅜	20¼	20	19	1
1883	18⅛	18	17⅞	17¾	1
1884	15	14⅞	15	14⅞	1
1885	11½	10⅜	11⅞	10⅝	1
1886	11⅜	11⅜	11⅜	11⅜	1
1887	12	11⅛	11⅛	10⅛	1
1888	17⅜	15 17/20	16⅝	16	1
1889	17½	16½	16¼	16½	1
1890	14½	14¼	14¼	14¼	1
1891	15	14⅜	14⅛	14⅛	1
1892	11	10¾	10¾	10½	1
1893	12½	12¼	12¼	12	1
1894	10¼	10	10	9⅜	
1895	10	9⅞	9⅞	9½	
1896	10⅛	9¾	11¼	10	1
1897	12	11½	12	11	1
1898	11	10 9/10	11¾	11⅞	1
1899	17	13½	18½	17	1
1900	16½	16¼	16½	16	1
1901	17	17	17	17	1
1902	11	13	12¼	13½	1
1903	12¾	12¼	13½	12¾	1
1904	13	12½	12¾	12¼	1
1905	15⅜	15⅛	15⅜	15⅜	1
1906	19	18⅛	18⅜	17⅞	1
1907	25⅞	25	25⅞	25⅜	2
1908	14 1/4	13¾	14½	12⅞	1
1909	14¾	14	14½	12¾	1

MONTHLY PRICES OF LAKE SUPERIOR INGOT COPPER. (Continued.)

(July-December.)

Year.	July.		August.		September.		October.		November		December.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1860	21¾	21⅛	21½	21½	22	21¼	22	21½	21½	20¼	20½	19¾
1861	18	17½	19	17¾	20½	19	20½	20	22½	20½	27	22½
1862	24½	22½	24½	24	27	24½	32¼	27	32⅝	30½	31½	30½
1863	32	29	31	29	32½	31	34¼	32¼	38½	34½	38¾	38½
1864	55	49	52½	50	52¼	47½	48	47	49	47	50	48½
1865	30½	28	32	30½	32¾	31½	33	32½	45½	33	45½	39½
1866	33½	31	31	30	31½	30½	31	30⅝	30½	26½	29	26½
1867	26	24	26¼	25¾	27¼	26¼	26¾	22¾	23	22¾	23	21½
1868	24½	23½	24½	24	24	23¾	24	23	24	22½	24½	23¾
1869	22⅞	21⅞	23½	21⅞	23	22	22¾	22	22¼	22	22	21½
1870	20½	20⅞	21⅝	20½	21½	20⅜	21¾	21½	23⅜	21⅜	22⅝	22¼
1871	22¼	21⅝	23	22⅜	22⅞	22⅞	23⅞	23¼	24¼	23¼	27	24½
1872	34	33	35	32½	35¼	33	34⅜	31¼	32¼	30¾	32½	30½
1873	29	26⅝	27½	27	27	25½	25½	24	24	21	25	23
1874	24½	20	21	19	21½	21	22¼	21¼	23¾	22¼	23¼	23¼
1875	23	22⅝	23⅜	23	23⅞	23⅛	23½	23	23½	23	23⅜	23⅜
1876	20	19½	19½	18¾	21	18⅜	21¼	20½	20½	20	20	19⅝
1877	19½	19	19	17⅞	18½	17⅞	18	17¾	17¾	17⅝	17¾	17½
1878	16½	16	16	16	16½	16	16	15½	15⅝	15½	16	15⅝
1879	16⅛	16	16⅜	16	17	16½	21½	18	21⅜	21	21½	21
1880	18⅞	18½	19⅛	19	18⅞	18½	18⅞	18¾	18⅝	18¾	19⅛	18⅞
1881	16½	16	16⅝	16⅜	18⅛	16¾	18⅜	18	19	18⅛	20⅜	19½
1882	18½	18⅛	18½	18⅛	18½	18	18½	18	18⅛	18	18	17⅞
1883	15⅛	15	15	15	15½	15⅛	15½	15⅛	15	14⅞	15	14⅝
1884	14½	13⅞	14	13⅞	13½	13	13½	12⅞	13	12½	12½	11
1885	11¼	10⅜	11¼	11	11½	10 9/10	11⅛	10⅜	11⅛	10⅜	11½	11 1/10
1886	10½	10	10½	10	11⅛	10½	11⅜	11⅛	12	11⅛	12½	11¼
1887	10¾	10⅛	10¾	10⅜	11	10⅝	12 3/10	10 3/10	14 13/16	11 11/16	17⅜	14 13/16
1888	16 3/10	16 13/16	17	16⅜	17 7/10	16 3/10	17⅜	17 7/10	17⅜	17¼	17 3/10	17 1/10
1889	12	12	12	12	12	11	11	11	13¼	11¼	14½	14
1890	17½	16½	17½	17	17	17	16⅞	16¾	16½	16¾	16	15
1891	12⅝	12½	12⅝	12	12½	12⅛	12⅝	11⅜	11½	11	11⅛	10½
1892	11⅜	11⅛	11⅜	11⅜	11⅜	11 1/10	11⅜	11 1/10	12	11⅜	12⅜	12¼
1893	10½	10¼	10⅝	9⅝	9⅞	9½	9¼	9¼	10¼	9¼	10½	10⅜
1894	9½	9	9½	9	9⅞	9⅛	9¾	9⅛	9¼	9⅜	10	9¼
1895	11½	10½	12½	11¾	12½	12	12	11⅞	11⅝	11	11	10
1896	11¾	11	11⅝	10⅞	10⅞	10⅜	10⅞	10½	11½	10⅞	11½	11½
1897	11⅛	11	11½	11	11⅜	11¼	11¼	11	11	10½	11	10⅞
1898	11¾	11½	12⅛	11⅜	12¼	12⅛	11½	12¼	11¾	12½	12⅞	12⅝
1899	18⅛	18¼	18½	18½	18¼	18⅜	18¼	17	17¼	17	17	16½
1900	16½	16⅝	16¾	16½	16⅞	16¾	16⅝	16¾	17	16¾	17	16¾
1901	17	16¾	16½	16¾	16¼	16½	16 13/16	16¾	16 13/16	16 13/16	17	13
1902	12	12½	11⅝	12⅛	11¾	12¼	11¼	12¼	11½	12	11⅝	12
1903	14½	13	13¾	13	13⅜	13¼	14	13	13⅜	12½	12⅝	12
1904	12⅞	12⅝	12⅞	12⅝	13	12½	14	12⅞	15⅜	13⅞	15½	14⅝
1905	15⅜	15	16⅜	15½	16½	16½	16½	16½	17¾	16½	18⅝	17⅛
1906	18⅛	18½	18⅞	18¾	20⅛	18⅞	22½	20¼	22¾	22½	24	22¼
1907	24⅞	22¼	22¼	20	19½	15½	15½	12⅜	14½	13½	14	13½
1908	13½	12¾	14	13½	14	13½	14	13⅜	14¾	14	14¾	14½
1909	13¾	13¼	13¾	13½	13¾	13	13½	12⅞	14	13⅛	14⅛	13½

CONVERSION TABLE FOR AMERICAN AND ENGLISH PRICES.

This table gives the equivalents, in American and English currency, for the s of copper, from £35 to £150 per ton. The American basis of weight is the dupois pound; the English basis is the long ton of 2,240 pounds avoirdupois. rate of exchange is figured at £1=$4.85:

(Pounds Sterling and Cents.)

... 7.58c.	£64...13.86c	£ 93....20.14c.	£122....26.41c.
... 7.80c.	£65....14.07c.	£ 94....20.35c.	£123....27.63c.
... 8.01c.	£66....14.29c.	£ 95....20.57c.	£124....27.85c.
... 8.23c.	£67....14.51c.	£ 96....20.79c.	£125....27.06c.
... 8.45c.	£68....14.72c.	£ 97....21.00c.	£126....27.28c.
... 8.66c.	£69....14.94c.	£ 98....21.22c.	£127....27.50c.
... 8.88c.	£70....15.16c.	£ 99....21.43c	£128....27.71c.
... 9.10c.	£71....15.37c.	£100....21.65c.	£129....27.93c.
... 9.31c	£72....15.59c.	£101....21.87c.	£130....28.14c
... 9.53c.	£73....15.81c.	£102....22.08c.	£131....28.36c.
... 9.75c.	£74....16.02c.	£103....22.30c.	£132....28.58c.
... 9.96c.	£75....16.24c.	£104....22.52c.	£133....28.80c.
...10.18c.	£76....16.46c.	£105....22.73c.	£134....29.01c.
...10.39c.	£77....16.67c.	£106....22.95c.	£135....29.23c.
...10.61c.	£78....16.89c.	£107....23.16c.	£136....29.45c.
...10.83c.	£79....17.10c.	£108....23.38c.	£137....29.66c.
...11.04c.	£80....17.32c.	£109....23.60c.	£138....29.88c.
...11.26c	£81....17.54c.	£110....23.82c.	£139....30.10c.
...11.48c.	£82....17.75c.	£111....24.03c.	£140....30.31c.
...11.69c.	£83....17.97c.	£112....24.25c.	£141....30.53c.
...11.91c.	£84....18.19c.	£113....24.47c.	£142....30.75c.
...12.12c	£85....18.40c.	£114....24.68c.	£143....30.96c.
...12.34c.	£86....18.62c.	£115....24.90c.	£144....31.18c.
...12.56c.	£87....18.84c.	£116....25.12c.	£145....31.39c.
...12.77c.	£88....19.05c.	£117....25.33c.	£146....31.61c.
...12.99c.	£89....19.27c.	£118....25.55c.	£147....33.83c.
...13.21c.	£90....19.49c.	£119....25.77c.	£148....34.04c.
...13.42c.	£91....19.70c.	£120....25.98c.	£149....34.26c
...13.64c.	£92....19.92c.	£121....26.20c.	£150....32.48c.

PROPORTION OF COPPER TO AMERICAN METAL PRODUCTION.

	Total Value of Metallic Products.	Total Value of Copper Production.	Production of Copper in Pounds.	Percentage of Copper Values
.....	$253,731,822	$ 33,833,954	231,270,622	13.3
.....	267,247,033	26,907,809	231,246,214	10.0
.....	305,735,670	30,848,797	265,115,133	10.1
.....	300,232,798	38,455,300	295,812,076	12.1
.....	307,936,189	37,977,142	352,971,744	12.3
.....	250,207,406	32,054,601	339,785,972	12.8
.....	218,382,494	33,141,142	364,866,808	15.2
.....	282,149,808	38,682,347	392,639,964	13.8
.....	287,860,155	49,456,603	460,061,430	17.2
.....	302,531,147	54,080,180	494,078,274	17.9
.....	343,748,268	61,865,276	526,375,591	18.0
.....	525,797,557	101,222,712	581,319,091	19.0
.....	550,425,286	98,494,039	602,808,839	17.9
.....	524,873,284	86,629,266	601,499,886	16.5
.....	642,258,584	76,568,954	659,508,644	11.9
.....	624,318,008	91,506,006	698,044,517	15.3
.....	542,081,983	105,629,845	812,537,267	19.5
.....	702,453,101	139,795,716	902,057,843	19.9
.....	886,110,856	177,595,888	918,635,216	20.0
.....	903,802,244	173,799,300	866,308,743	19.2
.....	549,923,116	124,419,335	942,936,449	22.6

PRICES AND SALES OF AMERICAN COPPER SHARES.

Company.	1903 Highest.	1903 Lowest.	1903 Sales.	1904 Highest.	1904 Lowest.	
Adventure	$18.00	$ 2.00	50,070	$ 7.87	$ 1.75	
Allouez	7.50	3.13	152,262	21.00	3.37	2
Amalgamated	79.50	35.50	1,717,341	82.75	43.13	...
Anaconda	31.12	15.63	7,791	29.75	15.37	...
Arcadian	6.13	.75	92,842	3.00	.25	
Arnold	.95	.25	4,582	1.50	.16	...
Atlantic	15.00	7.00	34,087	22.25	7.00	1
Bingham	39.00	20.00	126,200	38.75	19.00	2
Boston Cons.	.....	.....	.....	7.87	6.12	1
British Columbia	7.50	2.50	2,018	3.75	3.25	..
Calumet & Hecla	550.00	400.00	5,371	700.00	435.00	
Centennial	31.75	12.00	301,086	33.00	14.63	1
Copper Range	75.00	37.00	1,226,030	74.50	38.00	
Daly-West	48.56	30.50	46,749	36.50	11.63	
Elm River	5.38	2.00	67,078	4.00	1.75	
Franklin	14.00	6.75	23,377	15.00	7.87	
Granby	5.25	3.63	53,639	5.88	3.00	
Isle Royale	17.50	5.00	44,485	35.50	7.00	
Mass	18.00	3.00	65,717	10.00	3.00	
Mayflower	2.50	.50	15,634	2.00	.45	
Michigan	11.50	4.50	29,087	11.00	4.25	
Mohawk	58.00	31.00	120,526	57.75	34.12	
Montreal & Boston	2.88	.55	88,432	1.62	.40	
National	1.25	.75	820	2.00	.40	
Old Colony	2.50	.50	20,106	2.50	.87	
Old Dominion	23.50	3.75	119,849	29.00	9.00	
Osceola	79.00	43.00	83,419	98.00	53.00	
Parrot	34.00	16.00	59,512	33.50	21.00	
Phœnix	7.50	2.75	23,322	5.00	.50	
Quincy	126.50	80.00	6,438	125.00	80.00	
Rhode Island	3.75	.75	15,815	3.00	1.00	
Santa Fe	3.00	1.00	42,370	3.50	1.12	
Shannon	15.00	7.00	133,571	10.50	6.50	
Tamarack	189.50	75.00	15,239	140.00	94.00	
Tecumseh	1.80	.40	7,305	4.25	.25	
Tennessee	33.00	17.25	11,030	43.25	30.00	
Trinity	14.00	4.00	135,573	18.50	4.62	
United Copper	32.75	4.00	6,520	7.00	6.00	
United States	.....	.....	.....	28.75	19.75	
Utah Cons.	33.63	22.00	400,247	47.00	30.00	1
Victoria	9.00	1.50	52,925	6.37	2.12	
Washington	.50	.15	2,240	1.00	.10	
Winona	13.50	5.50	181,253	13.50	5.00	
Wolverine	77.00	54.00	28,794	110.00	68.00	
Wyandot	2.88	.75	34,552	3.00	.50	

DIVIDENDS OF AMERICAN COPPER MINES.

	1907.	1908.	1909.	Total.
.....	$ 7,500,000	$ 2,400,000	$ 1,200,000	$ 43,800,000
.....	1,994,865	1,167,584	573,860	13,399,284
.....	.....	.....	.....	990,000
.....	1,000,000	900,000,	1,000,000	5,550,000
na.....	5,750,000	1,800,000	1,800,000	59,575,000
.....	20,000	.....	.....	20,000
.....	.....	.....	.....	1,800,000
.....	1,650,000	.....	250,000	2,700,000
na.....	3,300,000	800,000	800,000	10,900,000
.....	6,500,000	2,000,000	2,700,000	109,600,000
.....	.....	.....	.....	55,000
ca.....	.....	.....	.....	2,767,700
.....	.....	.....	.....	2,130,000
.....	1,000,000	500,000	500,000	4,700,000
.....	.....	.....	.....	2,518,620
.....	226,832	.....	.....	226,832
.....	.....	.....	.....	1,760,000
.....	.....	.....	.....	100,000
.....	.....	.....	.....	350,000
.....	378,000	.....	162,000	6,119,000
.....	.....	.....	.....	1,240,000
.....	1,217,430	540,000	270,000	4,181,051
.....	.....	.....	.....	7,450,580
.....	80,000	.....	.....	5,642,000
.....	300,000	.....	50,000	4,150,000
.....	.....	.....	.....	160,000
.....	210,000	180,000	115,200	1,195,200
)	80,000	40,000	.....	2,180,000
.....	.....	.....	.....	1,820,000
.....	900,000	250,000	300,000	1,950,000
o.....	1,212,495	.....	.....	9,437,274
.....	.....	.....	.....	3,776,250
.....	.....	.....	.....	320,000
.....	.....	.....	431,700	431,700
.....	600,000	.....	.....	600,000
.....	2,400,000	1,200,000	1,200,000	8,200,000
.....	281,589	146,623	586,488	1,295,543
.....	1,249,950	192,300	769,200	8,381,750
.....	172,398	.....	.....	6,807,649
.....	.....	.....	.....	1,000,000
.....	.....	.....	.....	20,000
.....	1,350,000	495,000	440,000	18,890,000
.....	.....	.....	.....	959,370
.....	.....	.....	.....	72,000
.....	.....	.....	.....	100,000
.....	.....	.....	.....	100,000
.....	300,000	.....	.....	450,000

DIVIDENDS OF LAKE SUPERIOR MINES.

1849–1872.

	1849.	1850.	1851.	1852.
Cliff	$ 60,000	$ 84,000	$ 60,000	$ 60,000
Totals	$ 60,000	$ 84,000	$ 60,000	$ 60,000

	1853.	1854.	1855.	1856.
Cliff	$ 90,000	$ 108,000	$ 78,000	$ 180,000
Minnesota	.....	90,000	90,000	200,000
Totals	$ 90,000	$ 198,000	$ 168,000	$ 380,000

	1857.	1858.	1859.	1860.
Cliff	$ 180,000	$ 160,000	$ 180,000	$ .....
Minnesota	300,000	300,000	180,000	120,000
Totals	$ 480,000	$ 460,000	$ 360,000	$ 120,000

	1861.	1862.	1863.	1864.
Cliff	$ 80,000	$ 80,000	$ 180,000	$ 320,000
Minnesota	100,000	160,000	160,000	60,000
National	80,000	80,000	.....	80,000
Pewabic	.....	60,000	120,000	200,000
Quincy	.....	60,000	200,000	280,000
Franklin	.....	.....	60,000	100,000
Central	.....	.....	.....	50,000
Copper Falls	.....	.....	.....	60,000
Totals	$ 260,000	$ 440,000	$ 720,000	$1,150,000

	1865.	1866.	1867.	1868.
Cliff	$ 200,000	$ 120,000	$ 60,000	$ .....
National	40,000	.....	.....	.....
Quincy	160,000	.....	.....	60,000
Franklin	60,000	.....	.....	.....
Central	50,000	50,000	50,000	40,000
Totals	$ 510,000	$ 170,000	$ 110,000	$ 100,000

	1869.	1870.	1871.	1872.
Cliff	$	$	$ 100,000	$ 100,000
Minnesota	.....	.....	.....	50,000
National	.....	.....	20,000	20,000
Pewabic	.....	.....	20,000	40,000
Quincy	40,000	120,000	140,000	350,000
Franklin	.....	.....	20,000	40,000
Central	70,000	80,000	50,000	80,000
Copper Falls	.....	.....	40,000	.....
Hecla	100,000	300,000	250,000	.....
Calumet	.....	200,000	100,000	.....
Calumet & Hecla	.....	.....	900,000	2,400,000
Totals	$ 210,000	$ 700,000	$1,640,000	$3,080,000

DIVIDENDS OF LAKE SUPERIOR

1873–1888.

	1873.	
Minnesota	$	$
Pewabic	20,000	
Quincy	100,000	
Central	160,000	
Calumet & Hecla	2,000,000	
Ridge	50,000	
Totals	$ 2,330,000	$
	1877.	
Cliff	$	$
Quincy	80,000	
Central	140,000	
Calumet & Hecla	1,600,000	
Ridge		
Phœnix	20,000	
Atlantic		
Osceola		
Totals	$ 1,840,000	$
	1881.	
Quincy	$ 320,000	$
Franklin		
Central	120,000	
Calumet & Hecla	2,000,000	
Atlantic		
Osceola	225,000	
Totals	$ 2,665,000	$
	1885.	
Quincy	$ 180,000	$
Franklin	40,000	
Central	30,000	
Calumet & Hecla	1,700,000	
Atlantic	20,000	
Osceola		
Tamarack		
Totals	$ 1,970,000	$

DIVIDENDS OF LAKE SUPERIOR MINES. (Continued.)

1889–1904.

	1889.	1890.	1891.	1892.
uincy	$ 280,000	$ 320,000	$ 450,000	$ 350,000
anklin	80,000	80,000	80,000	160,000
ntral	40,000	20,000	20,000	.....
lumet & Hecla	1,500,000	2,000,000	2,000,000	2,000,000
tlantic	80,000	100,000	40,000	.....
sceola	50,000	225,000	150,000	150,000
marack	640,000	590,000	800,000	600,000
earsarge	.....	80,000	.....	.....
Totals	$2,670,000	$3,415,000	$3,540,000	$3,260,000

	1893.	1894.	1895.	1896.
ewabic	$ 160,000	$.....	$ 140,000	$.....
uincy	300,000	400,000	600,000	1,000,000
anklin	120,000	80,000	.....	.....
lumet & Hecla	2,000,000	1,500,000	2,000,000	2,500,000
sceola	100,000	.....	100,000	125,000
marack	600,000	400,000	400,000	360,000
earsarge	.....	.....	40,000	.....
Totals	$3,520,000	$2,380,000	$3,280,000	$3,985,000

	1897.	1898.	1899.	1900.
uincy	$ 800,000	$1,000,000	$ 950,000	$ 900,000
lumet & Hecla	4,000,000	5,000,000	10,000,000	7,000,000
tlantic	40,000	40,000	.....	80,000
sceola	191,000	277,250	558,450	571,200
marack	360,000	480,000	600,000	1,020,000
earsarge	40,000	.....	.....	.....
olverine	.....	60,000	210,000	240,000
Totals	$5,431,000	$6,857,250	$12,318,450	$9,811,200

	1901.	1902.	1903.	1904.
uincy	$ 900,000	$ 700,000	$ 550,000	$ 500,000
lumet & Hecla	4,500,000	2,500,000	3,500,000	4,000,000
tlantic	80,000	.....	.....	.....
sceola	576,900	.....	.....	192,300
marack	1,200,000	.....	.....	90,000
olverine	240,000	240,000	330,000	450,000
hampion	.....	.....	300,000	200,000
rimountain	.....	.....	300,000	.....
Totals	$7,496,900	$3,440,000	$4,980,000	$5,432,300

DIVIDENDS OF LAKE SUPERIOR M

1905–1909.

	1905.	1906.
Quincy	$ 600,000	$ 1,250,000
Central	160,000	.....
Calumet & Hecla	5,000,000	7,000,000
Atlantic	50,000	.....
Osceola	384,600	961,500
Tamarack	120,000	480,000
Wolverine	660,000	1,020,000
Champion	1,000,000	1,200,000
Baltic	1,250,000	1,400,000
Mohawk	.....	500,000
Trimountain	.....	.....
Totals	$ 9,224,600	$13,811,500
Copper Range Cons	1,536,086	2,304,810
Copper Range Co.	300,000	600,000
St. Mary's M. L. Co.	300,000	600,000
Grand Totals	$11,360,686	$17,316,310

Quincy	
Calumet & Hecla	
Osceola	
Wolverine	
Champion	
Baltic	
Mohawk	
Total	
Copper Range Cons	
Copper Range Co	
St. Mary's Mineral Land Co	
Grand Total	

DIVIDENDS AND ASSESSMENTS OF LA

1849–1909.

Company.	Assessments.	Divider
Adventure Cons.	$ 2,350,000	$
Ahmeek	850,000	
Albany & Boston	840,000	
Allouez	2,225,000	
Atlantic	1,180,000	990,0
Arcadian	1,800,000	
Arnold	810,000	
Ashbed	40,000	
Aztec	150,000	
Baltic	1,800,000	5,550,
Belt	1,300,000	
Bohemian	180,000	
Caledonia	140,000	
Calumet & Hecla	1,200,000	109,600,
Centennial (Old)	1,135,000	
Centennial (New)	1,755,000	

NDS AND ASSESSMENTS OF LAKE SUPERIOR MINES. (Continued.)

1849-1909.

Company.	Assessments.	Dividends.	Dr. Balance.	Cr. Balance.
.....	$ 100,000	$ 2,130,000	$.....	$ 2,030,000
.....	2,500,000	4,700,000	.....	2,200,000
.....	111,000	2,518,620	.....	2,407,620
rate.....	1,300,000	.....	1,300,000	.....
dls.....	1,000,000	100,000	900,000	.....
ange Cons.....	2,300,000	7,682,446	.....	5,382,446
.....	2,000,000	.....	2,000,000	.....
.....	1,200,000	.....	1,200,000	.....
Bluff.....	225,000	.....	225,000	.....
l.....	264,000	.....	264,000	.....
.....	180,000	.....	180,000	.....
.....	1,020,000	1,240,000	.....	220,000
.....	1,400,000	.....	1,400,000	.....
.....	120,000	.....	120,000	.....
.....	240,000	.....	240,000	.....
Old).....	200,000	.....	200,000	.....
le.....	2,750,000	.....	2,750,000	.....
.....	180,000	160,000	20,000	.....
r.....	2,800,000	.....	2,800,000	.....
ip.....	800,000	.....	800,000	.....
.....	300,000	.....	300,000	.....
.....	1,000,000	.....	1,000,000	.....
s.....	1,900,000	.....	1,900,000	.....
.....	800,000	.....	800,000	.....
.....	2,000,000	.....	2,000,000	.....
.....	2,000,000	.....	2,000,000	.....
.....	456,000	1,820,000	.....	1,364,000
.....	1,800,000	1,950,000	.....	150,000
.....	350,000	320,000	30,000	.....
dian.....	75,000	.....	75,000	.....
.....	400,000	.....	400,000	.....
t.....	283,000	.....	283,000	.....
.....	230,000	.....	230,000	.....
Rock.....	150,000	.....	150,000	.....
.....	840,000	.....	840,000	.....
y.....	1,100,000	.....	1,100,000	.....
.....	1,700,000	8,381,750	.....	6,681,750
nia.....	126,000	.....	126,000	.....
.....	400,000	.....	400,000	.....
.....	585,200	1,000,000	.....	414,800
Old).....	1,037,500	20,000	1,017,500	.....
ons	1,350,000	.....	1,350,000	.....
.....	200,000	18,890,000	.....	18,690,000
.....	470,000	100,000	370,000	.....
and.....	1,000,000	.....	1,000,000	.....
.....	100,000	.....	100,000	.....
.....	780,000	9,420,000	.....	8,640,000
Junior.....	640,000	.....	640,000	.....
.....	500,000	.....	500,000	.....
ain.....	2,000,000	800,000	1,200,000	.....
.....	500,000	.....	500,000	.....
.....	1,200,000	.....	1,200,000	.....
.....	2,000,000	.....	2,000,000	.....
.....	780,000	5,700,000	.....	4,920,000
.....	1,000,000	.....	1,000,000	.....
ous.....	10,000,000	.....	10,000,000	.....
tals.....	$78,497,700	$183,072,816	$60,675,500	$165,250,616
edit Balance....	.....	.....	.....	$104,575,116

CAPITALIZATION OF LAKE SUPERIOR COPPER COMPANIES.

Name of Company	Organized under laws	Authorized Capitalization	No. Shares Authorized	No. Shares Issued	No. Shares Unissued
Adventure	Michigan	$2,500,000	100,000	100,000	.....
Ahmeek	Michigan	1,250,000	50,000	50,000	.....
Allouez	Michigan	2,500,000	100,000	100,000	.....
Arcadian	New Jersey	3,750,000	150,000	150,000	.....
Arnold	Michigan	2,500,000	100,000	62,000	38,000
Ashbed	Michigan	1,000,000	40,000	40,000	.....
Atlantic	Michigan	2,500,000	100,000	100,000	.....
Baltic	Michigan	2,500,000	100,000	100,000	.....
Calumet & Hecla	Michigan	2,500,000	100,000	100,000	.....
Centennial	Michigan	2,500,000	100,000	90,000	10,000
Champion	Michigan	2,500,000	100,000	100,000	.....
Cliff (New)	Michigan	2,500,000	100,000	60,000	40,000
Copper Range Co	Michigan	2,500,000	100,000	100,000	.....
Copper Range Cons	New Jersey	38,500,000	385,000	384,185	815
Elm River	New Jersey	1,200,000	100,000	100,000	.....
Franklin	Michigan	5,000,000	200,000	100,000	100,000
Hancock	Michigan	5,000,000	200,000	100,000	100,000
Houghton	Michigan	2,500,000	100,000	67,000	33,000
Humboldt	Michigan	1,000,000	40,000	40,000	.....
Indiana	Michigan	2,500,000	100,000	80,000	20,000
Isle Royale	New Jersey	3,750,000	150,000	150,000	.....
Keweenaw	Michigan	10,000,000	400,000	200,000	200,000
King Philip	Michigan	2,500,000	100,000	100,000	.....
Lake	Michigan	2,500,000	100,000	86,500	13,500
La Salle	Michigan	10,000,000	400,000	302,977	97,023
Mass	Michigan	2,500,000	100,000	100,000	.....
Mayflower	Michigan	2,500,000	100,000	100,000	.....
Michigan	Michigan	2,500,000	100 000	100,000	.....
Mohawk	Michigan	2,500,000	100,000	100,000	.....
National	Michigan	2,500,000	100,000	75,000	25,000
New Arcadian	Michigan	3,750,000	150,000	150,000	.....
New Baltic	Michigan	2,500,000	100,000	70,000	30,000
North Lake	Michigan	2,500,000	100,000	100,000	.....
Ojibway	Michigan	2,500,000	100,000	84,000	16,000
Old Colony	Michigan	2,500,000	100,000	100,000	.....
Oneco	Michigan	2,500,000	100,000	70,000	30,000
Osceola	Michigan	2,500,000	100,000	96,150	3,850
Phœnix	Michigan	2,500,000	100,000	100,000	.....
Quincy	Michigan	3,750,000	150,000	110,000	40,000
Rhode Island	Michigan	2,500,000	100,000	100,000	.....
St. Mary's M. L. Co.	New Jersey	5,000,000	200,000	150,000	50,000
Seneca	Michigan	1,000,000	40,000	40,000	.....
South Lake	Michigan	2,500,000	100,000	60,000	40,000
Superior	Michigan	2,500,000	100,000	100,000	.....
Tamarack	Michigan	1,500,000	60,000	60,000	.....
Tecumseh	Michigan	2,500,000	100,000	54,959	45,041
Trimountain	Michigan	2,500,000	100,000	100,000	.....
Union C. L. & M. Co.	Michigan	2,500,000	100,000	80,000	20,000
Victoria	Michigan	2,500,000	100,000	100,000	.....
Winona	Michigan	2,500,000	100,000	100,000	.....
Wolverine	Michigan	1,500,000	60,000	60,000	.....
Wyandot	Michigan	2,500,000	100,000	100,000	.....

NUMBER OF SHAREHOLDERS IN LAKE COPPER COMPANIES.

1896–1908

(*By Years*)

Company	1896	1898	1900	1902	1904	1906	1907	190
Adventure	.....	....	1,046	1,050	1,283	1,093	1,162	1,18
Ahmeek	.....	....	....	....	114	195	214	23
Allouez	.....	....	465	554	726	537	542	54
Arcadian	.....	....	....	....	....	1,047	1,488	....
Atlantic	364	401	374	417	633	488	602	51
Baltic	.....	....	513	177	10	12	16	1
Calumet & Hecla	2,464	2,716	3,080	3,425	3,258	3,651	3,867	3,90
Centennial	.....	438	439	597	636	516	587	53
Central	.....	....	203	189	224	....	....	....
Champion	.....	....	....	8	8	8	8	
Copper Crown	.....	....	....	....	....	621	....	....
Eagle River	.....	....	....	....	....	....	....	....
Elm River	.....	....	....	....	562	163	649	63
Franklin	458	442	945	1,311	1,429	880	1,044	93
Frontenac	.....	....	....	....	....	6	6	
Gratiot	.....	....	....	....	....	....	14	1
Hancock	.....	....	....	....	....	570	796	8
Hulbert	.....	....	....	....	....	19	19	..
Isle Royale	.....	....	....	....	....	....	....	9
Keweenaw	.....	....	....	....	....	1,239	2,035	2,2
King Philip	.....	....	....	....	....	11	11	
Lake	.....	....	....	....	....	173	....	3
La Salle	.....	....	....	....	....	....	1,279	1,4
Laurium	.....	....	....	....	....	40	35	
Manitou	.....	....	....	....	....	7	7	
Mass	.....	....	477	....	....	1,005	1,066	1,0
Mayflower	.....	....	399	587	594	638	677	
Michigan	.....	....	592	933	937	872	1,128	1,
Middle Range	.....	....	....	....	....	4	4	
Mohawk	.....	....	594	951	1,076	1,434	1,934	1,
North Lake	.....	....	....	....	....	....	....	
Ojibway	.....	....	....	....	....	....	260	
Old Colony	.....	....	598	721	747	770	802	
Oneco	.....	....	....	....	....	192	219	
Osceola	823	1,477	1,512	1,985	2,089	1,544	1,570	1
Pacific	.....	....	....	....	....	122	115	
Phœnix	.....	....	352	582	642	....	....	
Quincy	978	1,445	1,540	1,557	1,657	1,561	2,174	2
Rhode Island	.....	....	1,100	1,216	1,339	980	1,043	1
St. Louis	.....	....	....	....	....	8	8	
Seneca	.....	....	....	....	69	....	....	
South Range	.....	....	....	....	....	30	38	
Superior	.....	....	....	....	....	216	295	
Tamarack	1,178	1,353	1,169	1,286	1,136	909	975	
Tecumseh	.....	....	....	....	....	379	23	
Torch Lake	.....	....	....	....	....	23	23	
Trimountain	.....	....	780	730	41	23	21	
Union	.....	....	....	....	....	327	330	
Victoria	.....	....	796	1,206	1,324	1,245	1,485	1
Whealkate	.....	....	....	....	....	5	8	
Winona	.....	....	637	909	878	801	1,047	
Wolverine	333	625	892	1,223	1,292	1,342	1,595	1
Wyandot	.....	....	....	....	....	657	814	
Totals	6,598	8,897	18,503	21,736	22,714	25,203	32,035	33

TWENTIETH CENTURY COPPER PRODUCTION.

1901-2000

Under this title an effort is made to forecast the future production o
in light of the figures of output of the past. Detective in details as such a
ecessarily must prove, when compared with actual figures of output, th
by no means fallacious.

The following table gives the copper production of the Twentieth C
ecades, with the percentages of increase of each decade compared wit
ecennium, and with the preceding decade:

Long Tons.

Decade.	Total Production.	Yearly Av'ge Production.	Percentage of First decade.
1801–1810	91,000	9,100	.....
1811–1820	96,000	9,600	5.50
1821–1830	135,000	13,500	48.35
1831–1840	218,400	21,840	140.00
1841–1850	291,000	29,100	219.77
1851–1860	506,999	50,699	457.13
1861–1870	900,000	90,000	889.01
1871–1880	1,189,000	118,900	1,206.59
1881–1890	2,373,398	237,339	2,508.12
1891–1900	3,708,901	370,890	3,975.71

Analysis of these figures shows that the average decennial percentage
r the century was 53.91%; for the last half of the century, 67.90%, and f
enty years, during which the electrical industry became a great consun
er, the average decennial increase in copper output was 77.83%. Me
ecades the increase in copper production during the Nineteenth Century
ld, from the first decennium to the last, while measured by years, and
ie production of 1801 at 9,000 tons, the production of 1900, which an
36,363 tons, was just fifty-fold as great as one hundred years earlier.
ncrease in production during the present century would give an output of
ons of copper for the year 2000.

The actual annual percentage of increase for the Nineteenth Cent
ery small fraction more than 4%, measuring outputs by decades, and
ver 4%, measuring annual products from 1801 to 1900, inclusive. I
now the actual increase in production by decades, as compared with the
ncrease at 4% yearly, the appended table is given, 1% being figured as eq
ncrease in 10 years, though actually but 48.02%.

TWENTIETH CENTURY COPPER PRODUCTION. (Continued.)

1901–2000

Long Tons.

Years.	Yearly Averages Theoretical	Actual	Actual Gain	Actual Loss	Percentage Theoretical Production
1801–1810	9,000	9,100	100	.....	101.11
1811–1820	13,500	9,600	.....	3,900	71.11
1821–1830	19,750	13,500	.....	6,250	68.35
1831–1840	29,625	21,840	.....	7,785	73.72
1841–1850	44,437	29,100	.....	15,337	65.48
1851–1860	66,656	50,699	.....	15,957	76.05
1861–1870	99,984	90,000	.....	9,984	90.00
1871–1880	149,992	118,900	.....	31,092	78.66
1881–1890	224,964	237,339	12,375	.....	105.99
1891–1900	337,447	370,890	33,443	.....	109.99

The foregoing table shows very plainly the effect of electrical demand for the metal, which first became a factor of importance in the ninth decade, shortly after 1880. Previous to that decade the theoretical increase of 4% annually, compounded, exceeds the actual increase in every decade, but after 1880 the actual increase exceeds the theoretical ratio. The actual copper output of 1900 was 486,732 tons, and the theoretical output for that year, based on the average of the decade 1890–1900, with 21⅔% increase for 5 years from the mean of 1895, would have been 410,560 tons. It is evident that the average ratio of increase of slightly more than 4% yearly, which ruled during the Nineteenth Century, is not the factor of the present electrical age. What that factor may be is uncertain. The electrification of the globe, while wonderful progress has been made, is not yet a sufficiently established fact to give accurate data for an average ratio of increase in consumption. The theoretical increase of 8% yearly, compounded, based upon the actual output of 486,732 long tons in 1900, would give a theoretical production of 811,404 long tons in 1907, whereas the output actually was only 713,155 long tons— or very materially less than the theoretical production on the basis of 8% compounded yearly, though the 8% increase was very fairly maintained during the first lustrum of the Twentieth Century.

In this connection it may be remarked that the highly valuable statistical compilations of the late M. Georges de la Bouglise, never published, but which M. de la Bouglise gave the author of this work the opportunity of inspecting, show, from 1840 to 1900, inclusive, an average annual increase, compounded yearly, of about 6.5% for all the leading commercial metals, including iron, copper, lead, tin and zinc, with a nearly similar percentage of increase in the output of coal, so necessary a concomitant of the metals. Following 1880, owing to the electrical demand, now consuming nearly one-half the world's production, copper made rapid gains over all the other commercial metals, except nickel and aluminum, metals so comparatively new in extensive commercial use that the percentages of gain are too abnormal to be used as basis for forecasting future consumption.

ENTIETH CENTURY COPPER PRODUCTION. (Continued.)

1901-2000

io of increase in copper production of the world has been 6 to 8% for s past. It has grown to be considered an axiom in the copper trade that increase is 8% yearly, but this ratio, while it may be considered the pres- as not been established for a sufficiently long time to be assured for an eriod in the future. The following table gives hypothetical outputs for year during the Twentieth Century, based upon various percentages of figured from the actual production of the closing year of the Nineteenth The compound increases, for facility in computation, are taken at slight n their actual value, as, for instance, 4% compounded for ten years is)% increase, instead of 48.02%, the actual figure; 5% is figured at 60%, 2.89%; 7% compounded is figured as 80% in ten years, instead of % is figured as only 110% instead of 115.89%.

(*Long Ton.*)

	At 4%.	At 5%.	At 7%.	At 8%.
.	486,732	486,732	486,732	486,732
.	730,098	778,771	876,117	1,022,137
.	1,095,147	1,246,033	1,577,011	2,146,488
.	1,642,720	1,993,654	2,838,621	4,507,625
.	2,464,080	3,189,846	5,126,317	9,466,012
.	3,696,121	5,103,754	9,227,372	19,878,626
.	5,544,181	8,166,007	16,609,269	41,745,115
.	8,316,272	13,065,612	29,896,685	87,664,741
.	12,474,408	20,904,980	53,914,033	184,095,956
.	18,711,613	33,447,968	97,045,260	386,601,507
.	28,067,419	52,516,748	174,681,468	811,863,165

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...IDGERWOOD

Steam and Electric

...OISTING ENGINES

Are Standard for Mines

LIDGERWOOD DOUBLE DRUM HOISTING ENGINE

...his engraving illustrates one of a set of Three Lidgerwood Hoisting Mach... ...ch engine ...equipped with one regular form of pan brake, which is operated by one of the hand levers ...at the right, having a friction brake and reversing, and is so compounded that in case ...f need one half the engine is capable of running. The three gears are the best in American ...ke drive, also have a pressure and feed lubrication. Four of these engines are at ...ecial operation at the mines of the Calumet and Hecla Mining Company, ...ng from a depth of four thousand feet, compressed air being used to operate ...

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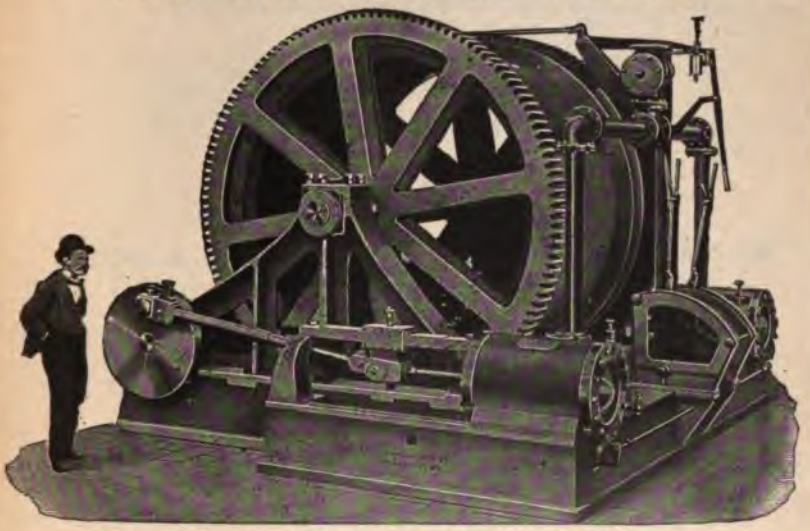

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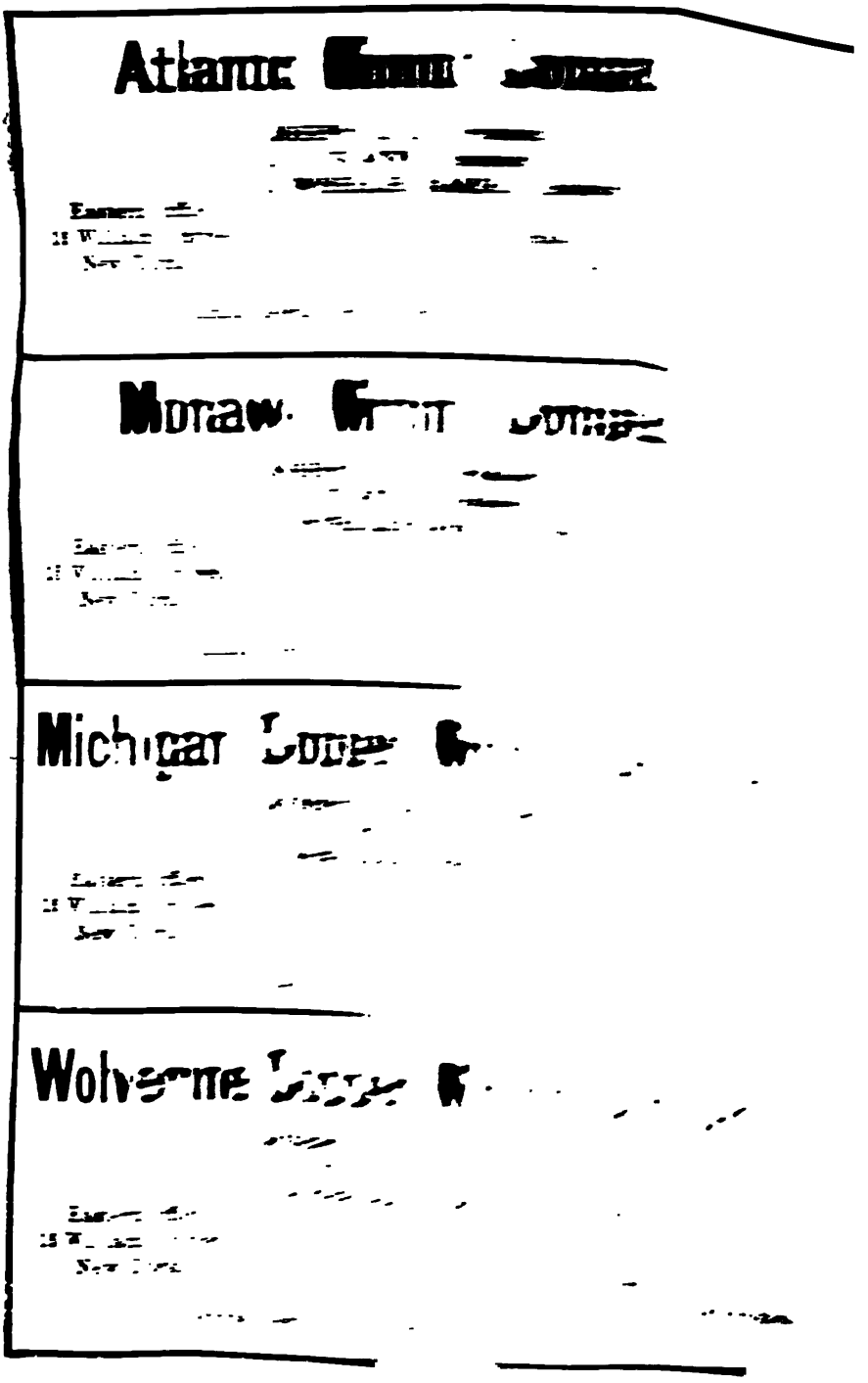

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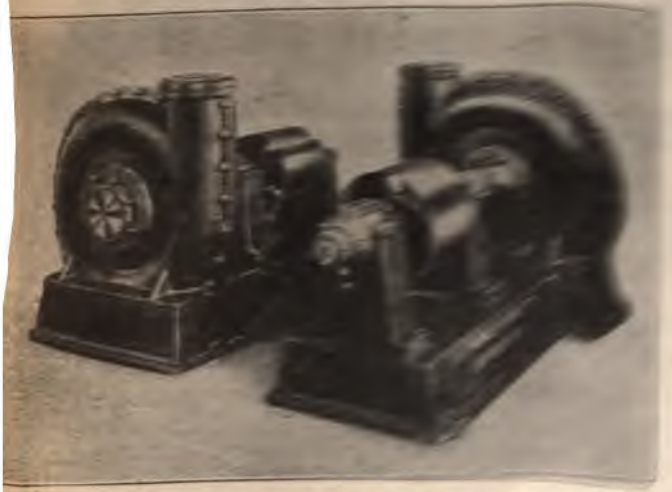

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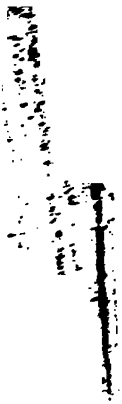
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